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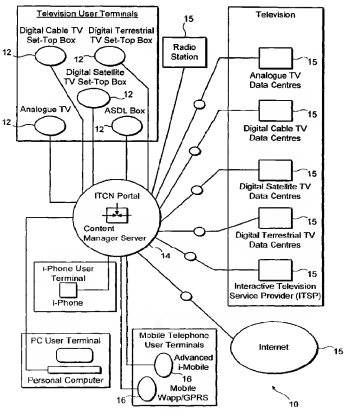
(54) Title: IMPROVEMENTS RELATING TO TELEVISION SYSTEMS



(57) Abstract: A system (10) for providing video or radio content to a user terminal (12) from a plurality of different television or radio content sources (15), such as cable and satellite television providers. The system (10) comprises means for receiving a request for video or radio content from a user terminal (12), means for identifying the source of the content requested and means for determining whether the user terminal (12) is suitable for receiving video or radio content directly from the source identified. In the event that the user terminal (12) is not able to receive content directly from the content source, the video or radio content is processed and broadcast to the user terminal (12) in a format that is receivable and interpretable by that terminal. In this way, television content that is available from a cable provider can be broadcast directly to a user terminal having only a satellite receiver.

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IMPROVEMENTS RELATING TO TELEVISION SYSTEMS

The present invention relates to improvements in television systems and systems for supplying video content to a viewer. In particular, the present invention relates to improvements in interactive television and internet systems and services. The invention also relates to an internet shopping system. In particular, an internet shopping system that combines real-time television broadcasts and internet technology to improve flexibility and interactivity.

Television is one of the most widely used media in the modern world. At present there are many sources of television signals, such as terrestrial, cable and satellite services. Terrestrial television is typically a free to air service that can be accessed by anyone who is has a television that is close enough to the terrestrial transmitter to receive the signal. Cable and satellite services are usually subscription based and only accessible by those having dedicated cable and satellite equipment respectively.

Whilst there are a large number of television services, the systems available at present tend to be inflexible and controlled by television broadcasters. For example, despite the fact that there are many different television systems available, users tend only to have equipment that is suitable for gaining access to the content from a single provider. A disadvantage of this is that the video content that can be accessed by viewers is limited by the receiving equipment that they have at their home, i.e. those with a satellite set top box can only receive satellite programs and those with a cable set top box can only receive cable television programs. This reduces the range of video content that can be

accessed by viewers. In addition, video content is typically only available to viewers at times that are determined by broadcasting schedules. The only way for television viewers to retrieve broadcast video content is to record that content using, say, a video recorder and then play it back. However, this can be inconvenient.

As regards internet services, many internet service providers currently allow users to interactively purchase goods on-line by choosing the item from a written menu, selecting it for purchase and then arranging for payment from, e.g. a credit card. Whilst this is a useful and fast way to buy goods, the products offered for sale cannot be picked up to allow the consumer to interact with them and view their features. Hence, internet shopping at present is limited by the fact that users are reluctant to purchase goods that they have not previously seen and are familiar with. This is disadvantageous.

Interactive services are also provided by some television service providers, such as Sky Digital in the UK or other digital TV providers, which interactive services can be accessed via a user's television. These systems typically allow the subscriber to use e-mail, access the Internet and select television programs. Some systems additionally allow the viewer to purchase products. However, the level of interactivity provided is low.

An object of the invention is to provide a flexible system and method for enabling viewers to have access to information content, in particular video, radio and internet content.

Another object of the present invention is to provide a television systsem that

gives viewers greater access to video content.

Yet another object of the present invention is to provide an interactive shopping system that is easy to use and allows the user to interact with the products that are offered for sale.

According to one aspect of the present invention, there is provided a method of providing video or radio content to a user terminal that is operable to receive content in a pre-determined format, the content being provided by a plurality of different television or radio content sources that are operable to transmit or broadcast radio or video content in other pre-determined formats, the method comprising receiving a request for content from the user terminal; identifying a source of the content requested; determining whether the user terminal or other target terminal is suitable for receiving content from the source identified and if not; processing the content into a format that is interpretable by the user or target terminal and transmitting or broadcasting the content to the user or target terminal in the processed format.

An advantage of this is that any content available on the system can be accessed, regardless of the type of equipment the user has and the delivery mode of the content supplier. This is because the controller is operable to translate and re-transmit any content desired by the user into a format that can be received and displayed by their equipment. This significantly broadens the amount of information to which the user has access.

According to another aspect of the present invention, there is provided a system of providing video or radio content to a user terminal that is operable to receive

content in a pre-determined format, the content being provided by a plurality of different content sources that are operable to transmit or broadcast radio or video content in other pre-determined formats, the system comprising means for receiving a request for video or radio content from a user terminal; means for identifying the source of the video or radio content requested; means for determining whether the user terminal or a defined target terminal is suitable for receiving video or radio content from the source identified, and means for transmitting or broadcasting or downloading the video or radio content to the user or target terminal in a format that is receivable and interpretable by that terminal.

The content can be video content or digital content or internet content or radio content.

Preferably, means are provided for processing the content from one format into another format that is interpretable by the user or target terminal. For example, an analogue to digital converter may be provided for converting content signals from a digital to an analogue format.

The user terminals could be any one of a digital cable TV set top box, a digital terrestrial TV set top box, a digital satellite TV set top box, an analogue television and an ASDL box or any other means for accessing and viewing video content. The receiver terminals could also be a mobile telephone with interactive capabilities, e.g. a WAPP or GPRS enabled telephone, or a TVPC.

The content sources could be any one of a digital cable TV data centre, a digital satellite TV data centre, a digital terrestrial TV data centre, an analogue TV data

centre, an interactive television service provider or an internet service provider or radio station or radio content centre. Hence, a user with a television could, for example, access via their television content provided on a mobile telephone digital network.

The content sources can be connected to the system via any suitable network, such as the internet or a digital or satellite network. Of course, the content providers could be located anywhere in the world.

According to a yet further aspect of the invention, there is provided a system comprising a plurality of video content sources connected via a telecommunications network for supplying video content and means for searching the video content sources to find video content that meets pre-selected criteria.

The video content sources may comprise cable and/or satellite and/or digital television. Preferably, the video content sources are television broadcasters. The video content may be part of a pre-determined broadcaster schedule or may be stored in a library of video content. The video content may be an advert or a television program.

Preferably, the telecommunications network is the internet. Alternatively or additionally, the telecommunications network may be a digital network.

Associated with each video content source is a memory for storing information on the video content available. The information preferably relates to a product that is shown in the video content, in which case the information is preferably

related to attributes of the product, for example, colour, price, size and style for clothing items and year, colour and model for cars. The information may relate to the nature of the video content, for example, news, current affairs, financial or sports, etc. The information may include an indication of when the video content is to be broadcast. The information may be stored in a database.

The means for searching the video content sources may search the video content information for video content that relates to a pre-selected product or content category. The means for searching are preferably a search engine.

Preferably, means are provided for providing the video content found to the user. The means for providing the video content may be broadcast means for broadcasting the video content to the user is real time. The broadcast means may be operable to transmit the video content over, for example, a digital cable or a digital terrestrial or a digital satellite or an analogue television network.

A controller may be provided for converting the broadcast video content from one format to another and then re-broadcasting the video content in the converted format. This is advantageous because it means that a user can have access to video content from a multitude of different sources, without actually having to subscribe to, for example, digital cable services. Hence, if a user does not have access to digital cable television, but the means for searching finds video content of interest on a digital cable network, the content can be transmitted to the controller and converted into a television signal format that can be received by the user. Once the conversion process is completed, the converted signal is broadcast to the user, who can then viewed the video content.

The controller may support world wide broadcasting standards, for example digital video broadcasting (DVB) or open cable (Advanced Televisions Systems Committee).

A plurality of user terminals may be connected to the controller, each terminal being operable to display video content and at least one of digital or internet content. Means may be provided in a user terminal for storing video content. Means may be provided for displaying a plurality of video images simultaneously on screen. This is advantageous because the viewer can readily compare products. The user terminal may comprise a PC or a digital television or a mobile telephone.

Preferably, means are provided for including prompts in the video content, which prompts, when selected, connect the user's terminal to an internet or digital site. Preferably, the internet or digital site provides means for enabling a user to buy a product.

According to yet another aspect of the present invention, there is provided a system for capturing video or radio content, the system comprising means for identifying a source of video or radio content being viewed or transmitted, means for selecting at least a portion of the video or radio content, a memory for storing a link to the video or radio content source, the link including details of the video content source and the selected portion of the video content, means for selecting the link and sending a request to the source of the video or radio content to receive the selected video or radio content and means for receiving

the video or radio content that is broadcast or streamed from the video or radio content source.

Preferably, the means for selecting at least a portion of the video content are operable to do so while the video content is being viewed. In this way, a user who is watching the video content can create links to real time television broadcasts. Hence, if something of particular interest to the viewer is displayed, a link can be generated so that the user can retrieve the selected content at a later date.

Preferably, means are provided for creating and sending e-mails and attaching the link to the e-mails. In this way, links to video content can be sent to other users, without having to send actual video content. This is advantageous, because it means that the bandwidth required to send the e-mail is minimal, but the recipient still has access to the video content.

Means may be provided for including an interactive prompt in the link, so that when the link is selected and the video content viewed, the prompt is automatically displayed. The prompt may be indicative of the availability of a pre-pay movie, wherein selection of the prompt by the user causes a request for payment to be generated.

Means may be provided for including the link in a text document. An advantage of this is that when the user is reading the document, video content can optionally be displayed.

According to still another aspect of the present invention, there is provided a method for capturing video content, the method comprising identifying a source of video content being viewed or transmitted, selecting at least a portion of the video content, storing a link to the video content source, the link including details of the video content source and the selected portion of the video content, selecting the link, sending a request to view the selected video content to the source of the video content and receiving video content that is broadcast or streamed from the video content source.

Preferably, the step of selecting is done while the video content is being viewed. The method may further involve sending the selected link to another party via e-mail.

The method may further involve including an interactive prompt in the link, so that when the link is selected and the video content viewed, the prompt is automatically displayed. The prompt may be indicative of the availability of a pre-pay movie, wherein selection of the prompt by the user causes a request for payment to be generated.

According to yet another aspect of the present invention, there is provided computer program, preferably on a data carrier or a computer readable medium, the computer program including instructions for identifying a source of video content that displayed on a display, selecting at least a portion of the video content whilst it is being viewed, storing a link to the video content source, the link including details of the video content source and the selected portion of the video content, selecting the link, and sending a request to view the selected video content to the source of the video content, whereby on receipt of that

request, the video content source broadcasts or streams the selected video content to the user terminal.

According to yet a further aspect of the present invention, there is provided a system comprising means for displaying a prompt on a screen during a television program, which prompt is indicative of the presence of further information relating to the program and means responsive to a positive response to the prompt for displaying on the screen an internet web page.

The prompt is associated with the URL of the web-site. Preferably, the web page is displayed on a portion of the screen simultaneously with the television program.

The television program may be a currently broadcast program. The television program may be a recorded program. The prompt may form part of the recorded program.

According to yet another aspect of the present invention, there is provided a computer program, preferably on a data carrier, comprising means for receiving a response to a prompt that is presented on a screen during a television program, which prompt is indicative of the presence of further information relating to the program, and means responsive to a positive response to the prompt for causing an internet web page to be displayed on the screen.

Preferably, the prompt contains or is associated with a URL of the web-site. Preferably, means are provided for displaying the web page on a portion of the screen simultaneously with the television program.

The computer program may be downloaded to the user.

According to a yet further aspect of the present invention, there is provided an interactive internet-based shopping system comprising a plurality of web sites, each site having associated with it means for storing information on a specific product or service and means, e.g. a search engine, for accessing the web sites and searching the associated information.

The means for storing information is preferably a database with a plurality of entries. Each of the entries in the database may be associated with a marker, which marker indicates at least one physical attribute of the product, for example, colour, price, size, style for clothing items and year, colour and model for cars.

Preferably, each web site is associated with a particular retailer or service provider.

Preferably, a control web site is provided that acts as a portal to the shopping system.

Means are, preferably, provided to allow a user to specify the physical attributes of the desired product. For example, means may be provided for presenting a menu to the user, which menu allows the user to select the desired product attributes. The menus are preferably customised for particular products, for example, for cars the attributes presented to the user may include colour, type, year and brand, whereas for clothing they might include colour, size, season and

item type. The search engine then searches for products having those attributes. Preferably, means are provided for comparing price information to determine which is the cheapest product that meets the user's specified requirements. The search engine may be operable to search for video content.

According to a yet further aspect of the invention, there is provided a computer game that has a graphics engine for providing graphics, wherein at least a portion of the graphics is downloaded from a remote location in real time. Preferably, the portion of the graphics is broadcast television video content.

According to a still further aspect of the invention, there is provided a mobile telephone that includes means for receiving television signals, means for displaying television content, a camera and means for transmitting signals received by the camera.

According to yet another aspect of the present invention there is provided a system comprising a user terminal having a screen, a means at a remote location for storing information to allow a product image to be constructed, means for accessing the stored information and selectively constructing and presenting a product image on the screen and means for selectively moving the image to enable a user to view the product at different angles. An advantage of this system is that it allows consumers to interact with real objects in a real-time environment.

Preferably, two or more product images may be presented on the screen at the same time. This is advantageous because a user can then compare the products.

Preferably, the means for selectively moving are operable to rotate the image.

Preferably, the product images are built up from a plurality of real images from real products. Preferably, the real object images are filmed at precise angles using Mpeg and camera technology. Preferably, a sphere of real still images is created. This could be done using a 360-degree panoramic camera that scans real photography around an object using pre-defined object paths. The sphere of still images may then be mapped out onto a mapped path of an object's shape that defines the object's structure. The mapped path is in essence a series of photo points that are spaced equally apart and positioned along an object to enable a computer to take the images and compose the object's structure by placing the photos exactly at each defining structural point of the object.

Means may be provided for varying the rate at which the still images or image frames are presented to the user. Varying the rate at which image frames are presented gives the user the impression that they are scanning over the product being viewed at different speeds. By reducing the frame rate on specific areas, product features can be highlighted, thus extending the viewing time and ensuring the maximum potential for the product sales. This is advantageous.

Means may be provided for enabling a user to change the speed at which the image is rotated.

The means at a remote location for storing information may be a database. Preferably each entry in the database is associated with a marker, which marker may indicate a physical attribute of the product, for example, colour, price, size, style for clothing items and year, colour and model for cars. The marker may

be an electronic signature.

Means for searching may be provided for searching for a product according to specific requirements set by the user. Preferably, the search is carried out using the electronic signatures.

Preferably, the means for searching is operable to search the database to identify products meeting the user's requirements. Preferably, the means for searching are operable to interrogate databases associated with a plurality of different web sites, in order to obtain up-to-date information on the product.

The means for selectively presenting one of the product images on a screen may comprise a PC and/or a digital television. The user terminal may be a PC or a television or a mobile telephone.

Preferably, the screen is adapted to display television video signals. Means may be provided for displaying a prompt during a television program, which prompt is indicative of the presence of further information relating to the program. Means responsive to a positive response to the prompt may be provided for connecting the user's terminal to an internet web page. Preferably, the web page is displayed on a portion of the screen simultaneously with the television program. Preferably means are provided for displaying more than one web page simultaneously.

Means for purchasing the product may be provided, in order to allow the user to purchase products.

Various aspects of the invention are defined in the accmpanying independent claims. Some preferred features are specified in the dependent claims.

Various systems and methods in which the invention is embodied will now be described by way of example only and with reference to the following drawings, of which:

Figure 1 is a diagrammatic view of an interactive television channel network;

Figure 2 shows a more detailed view of the network of Figure 1;

Figure 3 is a block diagram of a telephone box that is connected to the network of Figure 2;

Figure 4 is block diagram of a cable television content provider that can be connected to the network of Figure 2;

Figure 5 is block diagram of a satellite television content provider that can be connected to the network of Figure 2;

Figure 6 is an example of a search GUI;

Figure 7 is an example of a screen showing results of a search;

Figure 8 is an example of a GUI for allowing content providers to add television content into a search engine;

Figure 9 is an example of a listing of video content entered into the serach engine;

Figure 10 is a block diagram of a system for capturing and sending links to television content;

Figure 11 is an example of a GUI that is presented to a viewer to allow television content to be captured;

Figure 12 is an example of an e-mail that includes a link to television video content;

Figure 13 is a diagrammatic view of an arrangement for sending a link to video content from a satellite content source to a user with a cable television set top box, but no satellite set top box or dish;

Figure 14 is a block diagram of various user terminals that inlcude video cameras and are conntected to the ITCN;

Figure 15 shows an example of a video conferencing prompt;

Figure 16 shows a mobile telephone that has an interactive text message;

Figure 17 is block diagram of infrastructure behind an internet shopping web site;

Figure 18 is a block diagram showing a PC connected to the web site of Figure 17;

Figure 19 shows how a mouse can control movement of an image on the screen of the PC of Figure 18;

Figure 20 is a block diagram showing a television set top box connected to the web site of Figure 17;

Figure 21 shows an example of how the remote control of the television of Figure 20 can be adapted to navigate around the web site;

Figure 22 shows an example of search criteria selected by a user who is looking for clothes;

Figure 23 shows an example of search criteria selected by a user who is looking for a car, and

Figure 24 shows an example of a television screen, in which the user is presented with a currently viewed program and various interactive prompts.

Figure 1 shows an interactive television channel network (ITCN) 10. This comprises a plurality of user television terminals 12 that are connected via a

telecommunications portal or control hub 14 to a plurality of different sources or suppliers of television, radio, internet and digital content 15. The user terminals 12 could be any one of a digital cable TV set top box, a digital terrestrial TV set top box, a digital satellite TV set top box, an analogue television and an ASDL box or a TVPC or any other means for accessing and viewing televised video content. As will be appreciated, the user terminal 12 could also be a built in device such as a conditional access module that receives interactive digital television (IDTV) without a set-top box. The user terminal 12 could also be a mobile telephone 16 with interactive capabilities, e.g. a WAPP or GPRS or GSM enabled telephone, preferably adapted to include a television signal receiver and screen, as will be described in more detail later.

Included in each of the user terminals 12 is a software application for controlling access to the ITCN 10. The provision of software in the user's terminal 12 reduces the amount of information that has to be downloaded in real time to the user when the system is activated and so improves the overall speed. Each user terminal 12 is registered with the ITCN 10, together with details of the type of of television receiver equipment available, e.g. a cable set top box, and a unique address for that equipment. In this way, each user terminal 12 can be uniquely identified by the system. In order to monitor charges for services provided, on registration, an account is typically set up for each user.

On the supply side of the ITCN 10, the sources of content 15 could be any one of a digital cable TV data centre, a digital satellite TV data centre, a digital terrestrial TV data centre, an analogue TV data centre, an interactive television service provider or an internet service provider or a radio station or radio data centre. The content sources 15 can be connected to the ITCN via any suitable

network, such as the internet or a digital or satellite network. Of course, the content providers 15 could be located anywhere in the world.

As with the user terminals 12, each content supplier 15 is registered with the ITCN 10, together with details of its nature and how it broadcasts its television content, e.g. via cable or satellite, the frequencies at which it can transmit content and a unique address. In this way, each content supplier 15 can be uniquely identified.

The ITCN 10 is a system that integrates television with the internet and/or a digital network. Included in its portal or control hub 14 is an operating system for controlling user access to television content made available by the content providers 15. It should be noted that although Figure 1 shows the ITCN control hub 10 as being at a single location, separate from the content providers 15, it is likely in practice that it will be a distributed system, parts of which could be located at the facilities of the television content providers 15.

In its most basic form, the ITCN 10 is adapted to receive requests for television or radio content from user terminals 12 and cause the requested content to be transmitted to the user in a format that is suitable for reception by the receiver at the user terminal 12. This is done regardless of whether the user's terminal 12 is adapted to receive content directly from the source 15 of the content requested. For example, the ITCN 10 is able on request from a user having a satellite receiver to take content from a cable television source 15 and cause that content to be transmitted to the user in a format that is suitable for reception by the satillite receiver. This is advantageous because it means that an ITCN 10 user can newtork hop and therefore have access to video content from a

multitude of different television sources 14, such as digital cable or digital satellite, without actually having to have dedicated hardware for receiving signals from those sources.

In order to allow content from a particular provider to be available to users having recievers that are not adpated to receive that content directly, processing and conversion equipment is included at the ITCN 10 so that, when necessary, television signals can be converted from one format to another. For example, the ITCN 10 may include an analogue to digital converter for converting analogue signals into a format suitable for reception by a digital receiver. Broadcast facilities are also provided as part of the ITCN 10 for broadcasting the video signal in its converted format. For example, the ITCN 10 may include a satellite transmitter. Alternatively, the ITCN 10 operating system may be operable to send content from one network to another, together with a request to the other network to cause the content to be transmitted via their network. For example, the ITCN may be operable to send cable content to a satillite network, together with a request for the satellite network to cause the content to be transmitted via satillite to the user.

In order to conform with broadcasting requirements, the broadcast facilities in the ITCN typically support worldwide broadcasting standards, for example digital video broadcasting (DVB) or open cable (Advanced Televisions Systems Committee). The ITCN is additionally adapted to operate across most telecommunications networks, for example, broadband, DSL and support all forms of broadcast, e.g. DSB, DTT, CATV.

All applications contained within the ITCN are designed to operate across various delivery lines using for example internet protocol (IP) and digital subscriber line (DSL) technology. DSL provides analogue-to-digital transmission technology using modems attached to a twisted pair copper line infrastructure. DSL is a method of delivery that provides high transmission capacities for delivery of high speed broadband traffic to small and medium sized enterprises (SME) and home users via existing telephone lines. DSL has the ability to support internet communications by re-routing traffic from voice and data networks, which reduces the number users on congested public switched telephone networks (PSTN). This offers considerable performance advantages because data travels on a dedicated line.

There are several versions of DSL that the ITCN applications use:

DSL - Digital Subscriber Line referred to as DSL or xDSL this is the standard format.

ADSL - Asymmetric DSL provides greater bandwidth downstream to end users than for upstream transmissions from users. Ideal for video-on-demand, home shopping, Internet access, remote Lan access and multimedia.

DSL lite - Digital Subscriber Line Lite is a variation of ADSL that operates at a lower level of 1.544 Mbps. This is simple to install.

SDSL - Symmetric DSL enables providers to offer T1 (1.544 Mb/s) or E1 (2.048 Mb/s) services and can accommodate data applications such as web hosting, servers and LANs, that need symmetric access, equal rates of data transmission upstream and downstream from and to the end user.

HDSL-2 - Higher data rate DSL-2 provides advanced modulation technologies for transmitting T1/E1 singles

VDSL - Very high rate DSL, operates at up to 60 Mb/s through a trading off loop length. This is required for high bandwidth applications within the ITCN.

RDSL - Rate-adaptive asymmetric digital subscriber line. This offers a flexible high-speed bandwidth that is a variation of ADSL and is capable of adjusting transmission speed based on signal quality and length of transmission. This can be used to broadcast video content on demand when, for example, a user clicks on a data link that is attached to an e-mail, as described previously. An advantage of RDSL is that the transmission speed can adjust as signal quality improves or deteriorates therefore retaining the same level of quality and speed.

The ITCN also operates on broadband networks to deliver applications and video content. Broadband networks are communication systems in which the transmission medium (i.e. fiber-optic cable) carries multiple messages at a time, each message being modulated on its own frequency by means of modems. Broadband networks are commonly used in wide area networks (WAN) and as a delivery method for digital TV. Typically, broadband network stations are connected by coaxial, Hybrid Fiber Coax and fiber-optic cable, which can be used to carry video, data and voice simultaneously over multiple transmission channels that are distinguished by frequency. An advantage of this is that 20 megabytes or more can be delivered over the network. However, this is more expensive than a baseband network and can be difficult to install. This technology is used by cable TV (CATV) and is also known as wideband transmission.

The ITCN is additionally operable to transmit content, whether video or otherwise, over cable television (CATV) networks, which use coaxial or fiber-optic cable to distribute a broadband signal containing many separate television channels. CATV systems are also increasingly being used to carry digital data, for example internet content to and from subscribers.

In order for the ITCN to function across all television satellite networks, it includes a device that provides transponder bandwidth capability. This enables the transceiver in a communications satellite that receives a signal of any form of data, video, internet etc from an earth station and re-transmits the data on a different frequency to one or more earth stations. This enables the passing of ITCN data and communications across all Digital Satellite Systems (DSS).

Direct broadcast satellite (DBS) technology uses geo-stationary orbit satellites (GEO) to receive digitised signals transmitted by ground link upbased centres. This technology is included in the ITCN. Once the signals are received, the satellite beams the signal across a wide swath to user's satellite dishes, which pass the signal to a set-top box where it is converted to an analogue signal before sending it to the television set. This technology is used to deliver not only television broadcast content but also e-mails, interactive content and content for the ITCN applications.

In addition to the above, the ITCN can operate on various Digital Services or Signals (DS). There are various categories used to define the transfer speed, number of channels and characteristics of digital transmissions whether T1, T2, T3 and T4 lines of communication. The lowest DS unit or level 1 referred to as DS-0 transmits data at a rate of 64 Kbps - the rate of a single T1 channel.

Higher speeds consist of multiple DS-0 levels, for example DS-1 represents a single T1 line that transmits at a rate of 1.544 Mbps. Other higher rates are made up of T1 lines which are multiplexed to create DS-2 (a T2 line having four T1 channels and transmits at 6,312 Mbps), DS-3 (a T3 line having 28 T1 channels and transmits at faster rate of 44.736 Mbps) and finally DS-4 (a T4 line having 168 T1-channels that produces a rate of transmission of 274.176 Mbps). The selection of the DS used depends on the bandwidth required for a specified application or number of users. For example the greater the content and number of users the higher the bandwidth required and the greater the level of DS required.

The majority of devices in the ITCN interpret the DSs through a universal serial bus (USB) (a serial bus with a data rate transfer of 12 Megabytes per second for connecting peripherals to the device), an ACCESS bus or DSP technology. Some of the hardware devices that connect to ITCN contain a built-in digital signal (DS) processor. This processor is an integrated circuit developed for high-speed data manipulation, which is used for audio, communications and image manipulation, data acquisitions and data control applications. The majority of user devices that are connected to the ITCN, such as digital set top boxes have a built in USB. For example a set-top box with a built in USB has the capability of installing 127 peripherals, such a video conferencing camera, DVD disc drive etc. USBs are specifically designed for high-speed applications that require a high Mbps, such as Interactive TV and the ITCN applications. Lower speed buses are however available and these could be used to access ITCN applications, for example DEC's ACCESS.bus, which is suitable for low-bandwidth applications.

The ITCN is arranged to pass data and communications to devices and between users using pre-configured data switches, which route incoming data to various sources, whether a digital television set-top box, personnel computer or mobile phone. Alternatively this may be software driven.

One arrangement for facilitating internet usage, which the ITCN uses, is a digital subscriber line access multiplexer (DSLAM). This is a device that is controlled by a telephone company central office that splits DSL subscriber lines and connects users to the internet network hosts and public telephone network system (PTNS). An advantage of DSLAM is that it enables both voice and data services to be transmitted through a pair of twisted copper wires.

The ITCN also operates across other various technologies for the delivery of broadcast and content across all television, mobile and IP networks to the end users. Examples of these include:

Narrowcast – this is a method of transmitting data programming to a defined or limited area or audience. A cable television company narrowcasts its programs only to subscribers, whereas network television stations broadcast to everyone with the reception equipment in range. On the Internet, content delivered via push technology represents a form of narrowcasting

Unicast – this is a method of transmitting data between a single sender and a single receiver over a network, referred to as a two-way, point-to-point transmission. This method that can be used for Interactive video conferencing or transmitting of video content between users on the same TV network, Mobile Network or Internet.

Multicasting – this is a method of sending a message or content to more than one destination across the ITCN network. This can be used in relation to the e-mail system described previously, whereby users are able to send data links of television programs and adverts. Alternatively, this method can be used to Broadcast a Radio/TV transmission sent more than one recipient within the ITCN.

Webcasting – this is a method of broadcasting data via the World Wide Web using push and pull technologies, which enables the transmission of data from a server to a client.

In addition to the above mentioned methods of delivery, the ITCN uses the global system for mobile communication (GSM) for delivering content and applications to mobile phones. GSM is a wireless platform based on time division multiple access. It can support multiple functions including telephony, voice mail, call forwarding, fax, caller ID, and more importantly internet access and e-mail. GSM operates at three different frequency ranges 900MHz (GSM900) in Europe and most of the World, 1800MHz (GSM1800) in a few European countries and 1900MHz (GSM 1900) also known as PCS 1900 or DCS 1900 in the United States. The ITCN also supports other mobile technologies such as GPRS, WAPP and G3.

Included in the ITCN are multiplexers for use in input/output operations for transmitting a number of separate signals simultaneously over a signal channel or line. Multiplexing retains the integrity of each signal by separating the signals through time, space or frequency. An advantage of this is that a number of different programs can be transmitted over single frequency, which means a greater total number of programs on one TV network. Therefore, not only is it

important that the correct frequency is used when searching for broadcast content, but also the transponder and channel number must be identified and searched for, so that the applications can identify the correct data source. This applies to the majority of applications within the ITCN including the e-mail system, the TV navigator and games graphic engine, which are described in more detail later.

Another method of multiplexing that is used by the ITCN for the passing of content and communication is frequency divisional multiple access (FDMA) in which the set of frequencies assigned to a cellular phone service is divided into 30 separate channels, each of which is used by separate users. This technology is widely used in North America and in other countries, where it is used in AMPS, which is an advanced mobile phone service. APMS is the standard for analogue cellular phone services and relies on FDMA, which offers a range of frequencies from 800MHz to 900MHz into 30 KHz for voice. There are two variations of AMPs which the ITCN offers: N-AMPS for narrow-bandwidth requirements and D-AMPS for Digital Advanced Mobile Services. The ITCN also uses TDMA, another Multiplexing technology for allocating separate time slots on the ITCN for each user. This facilitates the ITCN (GSM services).

Another function of operation of the ITCN is the ability to translate a digital signal to an analogue signal using digital-to-analogue converters (DAC). The ITCN also uses analogue-to-digital converters, which convert continuously varying analogue signals, such as sound or voltage from a monitoring instrument, to binary code for a computer, digital television or mobile phone. In this way, the ITCN can convert digital content received from digital service providers to analogue content that can be re-transmitted via, for example,

terrestrial television networks for receipt by users with only conventional televisions. Likewise, the ITCN can convert analogue content to digital content that can be re-transmitted via a digital network, such as a cable television network, for receipt by users with the appropriate digital equipment.

The ITCN supports many standards, including IP based or digital standards. For example, the ITCN support standards DSL, VDSL, and HDSL-2. These are types of analogue-to-digital transmission that use copper wiring instead of fibre-optics. This increases speed and performance. For the delivery of interactive IP content on digital television, the ITCN is adapted to support standards such as HTML, DHTML, XML and Java using a built in streamlined web browser contained with the Navigation application, thus providing backward compatibility. The ITCN is also adapted to support screen standards such as HDTV, DRC and traditional standards such as NTSC, PAL, SECAM. In addition, the ITCN is adapted to support existing hardware platforms, such as NT, Unix, Linux, Sun, Cisco etc, although it is generally hardware independent

The software used in the applications that are provided in the ITCN and at user terminals are typically written in JAVA and use the advantageous features of JAVA applets. It will, however, be appreciated that any suitable programming language could be used.

As will be understood, the ITCN includes many different parts. These could be provided at a central location or may form part of a distributed network of parts that are geographically separate. Indeed part of the functionality of the ITCN could be located at or within one of the content provider's facilities. Figure 2

shows an example of this, in which some of the ITCN software is located on servers at a television broadcaster facility.

Figure 2 shows a more detailed example of an ITCN infrastructure 10, in which the main system application is located in middleware servers 20 at the head end 22 of a cable television provider. It will be appreciated that in practice a plurality of television content providers could be connected, for example satellite and terrestrial television content providers. The software at the middleware servers 20 controls many aspects of the overall system functionality and in particular incoming signals from users, e.g. requests for television or radio content, and outgoing signals to content providers. Connected to the middleware servers 20 is a router 24 that is operable to direct all incoming and outgoing communications to the appropriate location. Also connected to the middleware servers 20 are a local ad insertion application 26 that is able to insert video content relating to regionally placed advertising to provide locally relevent interactive adverts and a video manager 28.

Connected to the local ad insertion application 26 and the video manager 28 is a multiplexer 30, which is also connected to video on demand servers 32 that include a database of video content that is available on demand. In this case, since the television operator is a cable television content provider, the content in the video on demand servers 32 is cable television content. The video manager 28 is operable to control the placement and structure of the content in the video on demand servers 32, by sending control signals via the multiplexer 30. Additionally connected to the multiplexer 30 is an LMDS transceiver 34 that is operable to receive and transmit wireless signals from wireless devices such as

mobile telephones. The multiplexer 30 is also connected to the router 24 via a high bandwidth optical cable.

Connnected directly into the router 24 are an MPEG-2 encoder 36 for compressing incoming television signals, for example satellite or terrestrial signals that are provided by other content providers. Also provided is a QPSK/MPEG-2 encoder 38, which is a receiver for receiving (typically out of band) data, which may be video content, from a downstream interactive channel from another content source, for example a satellite provider. Also connected to the router 24 is a data voice convergence device (DVC) 40 for transmitting voice and data content, but not video content to the router 24. The DVC 40 is connected directly to the PSTN for receiving audio communications from external sources. This can be advantageously used for the transmission of requests, which saves on bandwidth usage on lines that can be used for television video content transmission.

Connected to the head end 22 via the router 24 is an operational support system 42 that provides various support services, such as billing and subscription. A flexible subsrcription system will be described in more detail later.

Connected to the head end system of Figure 2 is a user terminal that has equipment for receiving cable television. It will of course be appreciated that in practice many thousands of such users would be connected. As shown, at the cable user location, there is provided with a telephone 44 that is adapted to receive television signals (this will be decribed in more detail later), a PCTV 46, a television with a cable set top box 48 and a games console 50 that has a television receiver for receiving real time television signals. Included in each of

the user terminals is software for accessing the ITCN. Alternatively, access software may not be primarily stored at the user terminal, but may instead be stored at a remote location, for example, in the middleware servers. The user terminals are each connected to a cable modem 52, which is in turn connected via hybrid fibre coaxial (HFC) cable 54 to a local hub 56 that has a multiplexer 58 and a router 60. In this way, signals from each of the cable user terminals can be sent via the cable modem 52 to the local hub 56.

Connected to the hub router 60 is a switch array 62 that is selectively operable to connect each of the user terminals, typically via high band width optical cables 63, to the router 24 in the TV operator head end 22. The head end router 24 is operable to interpret the user originating signals and direct them to the ITCN middleware servers 20. In this way, each of the user terminals can be connected into the main ITCN operating system.

In addition to a cable television subscriber, Figure 2 shows a satellite home user 64. In this case, the user's equipment includes a PCTV 66 that can access the internet, a television with a satellite set top box 68, an internet telephone 70 and a games console 72, each of the telephone and the games console being operable to receive television signals. Each of these is connected to a DSL modem 74 and from there via an ADSL loop 76 to a DSLAM switch 78 that is in turn connected to the head end router 24. In this way, the satellite user is connected to the ITCN.

In addition to direct physical connection to the ITCN, wireless connection via, for example, a mobile telephone network is possible. In the example of Figure 2, a LMDS transceiver 34 is provided in the television operator head end, which

is operable to receive and interpret signals from, for example, GPRS or WAPP or GSM mobile phones 80. In addition, the LDMS transceiver 34 is able to receive signals from other mobile devices 82 such as an interactive telephone, a lap top computer or a palm pilot with means for transmitting signals over a wireless network. In order to access television content available via the ITCN, each of the mobile devices is adapted to receive television signals via a wireless communications link. This could be done either by varying the frequency at which the wireless devices 80, 82 receive data or by including in each of these devices a dedicated television receiver for receiving television signals.

Several content providers are shown connected to the ITCN of Figure 2. These include a digital radio station 84, an interactive television service provider 86, a corporate content provider 88, a wireless base station 90 and a television provider22, which in this case is the cable television provider 22, but could additionally or alternatively be a satellite television provider.

As regards the digital radio station 84, this is provided with an ITCN middleware server 92 that includes software for controlling communications with the middleware server 20 in the television operator head end 22. Connected to the radio middleware server 92 are audio servers 94 that have a database of available audio content. This could include content that is available on demand or at scheduled times. Also provided is an audio manager 96 that is operable to communicate with a local advert insertion/content database 98 for controlling local ad insertion as and when desired by the content provider. The output of each of the audio content servers 94 and the advert insertion database 98 is fed to a multiplexer 100, where the outputs can be added.

Connected to the radio station multiplexer 100 is a switch 102 that is also connected to the radio middleware servers 92. The radio station switch is connected via an optical cable to the router 24 in the television operator head end 22, thereby to provide a transmission path for audio content. Alternatively, the radio content could merely be transmitted to the head end via a radio transmitter in the radio station 84. In this case, however, a radio receiver would be needed at the head end or at a local hub, from where the content could be distributed directly to the user terminal that made the original request. The radio end switch 102 is also connected via a 10Mb link 103 directly to the television operator ITCN middleware servers 20, so that control signals and requests can be sent directly between the ITCN and radio middleware servers 20 and 92 respectively. The ITCN radio server 94 is operable to control the radio end switch 102 as and when desired to send signals to the ITCN middleware servers 20. Of course, the ITCN middleware servers 20 could be configured to control the radio servers 94 directly via the 10Mb data link 103.

Also connected to the ITCN network of Figure 2 is an interactive television provider 86, which is able to provide internet and television content. Included at this site 86 are video on demand servers 104 that include a database of video content that is accesible via the service provider and a client application server 106, which may host various system applications. Each of the video on demand servers and the client application 104 and 106 respectively are connected to a multiplexer 108. Software is provided for accessing the video on demand servers 104, which software could be located on the video on demand servers themselves or in the client application servers 106 or alternatively on a dedicated video manager (not shown). Connected to the multiplexer 108 is a switch 110 for controlling the sending of signals from the interactive television

provider to the ITCN. The switch 110 is connected via an optical cable 112 to an ATM switch array 114, which is in turn connected to the router 24 in the television provider head end. Also connected to the switch 110 via an NTSC link is a television 116, so that video content on the televsion 116 can be transmitted therefrom and received over the network. Also connected to the switch 110 is a proxy router 118 for directing incoming internet content onto the network. All of the content provided at the interactive television provider 86 can be transmitted via the optical cable 112 to the router 24 in the head end and from there to the head end ITCN middleware servers 20.

As regards the wireless base station 90 of Figure 2, this has a wireless transmitter 120 and receiver 122. Connected to the receiver 122 is a combiner 124 for bringing content from different sources together and for splitting multiplexed signals into their constituent parts. The combiner 124 is in turn connected to multiplexer access cards 126, including a frequency divisional multiplexer access card (FDMA) and a time divisional multiplexer card (TDMA), which are provided to control the frequency of out-going signals. These cards 126 are connected to the transmitter 120. Also connected to the cards 126 are a control complex 128, which is operable to receive signals from any one of the content providers on the network, an ATM switch 130 for receiving content along an ATM based network and a WAN interconnect 132 for receiving content via a high bandwidth optical cable. Each of the control complex 128, the ATM switch 130 and the WAN interconnect 132 is operable to send signals to the router 24 in the television head end.

In addition to conventional content providers, it is envisaged that corporate bodies, such as retail companies, could provide content on the ITCN from their

own sites. To this end, the corporate content site 88 has to be connected to the middleware servers 20 at the television provider site. Typically, the corporate site 88 includes video servers 136 for providing video content and links to the corporate WAN or intranet or virtual private network through an SDSL link. Also optionally provided are a camera 138 and a television 140, each of which can be used as a source of video content for transmitting over the network. In this way, the corporate facility is able to host its own television programs or adverts, this video content being accessible externally. Each of the video content sources is connected to a switch 142 that is in turn connected via a high bandwidth optical cable 144 to the router 24 in the head end of the television operator. In this way, the switch 142 can selectively connect each of the corporate content sources to the network as and when desired. Hence, content from each of the sources provided at the corporate site 86 can be transmitted to the ITCN middleware servers.

Figure 2 also shows a public telephone box 148 that is connected to the system and adapted to receive video content from the ITCN – a more detailed example of the contents of this is shown in Figure 3. This includes a main module 150 that has a digital television tuner 152, a central processor 154, a hard disc 156 that has software for allowing access to the ITCN, a memory 158, a cache 160, a sound card 162 and a modem 164 for connecting the box to the router 24 in the television operator head end 22. In this way, the telephone box 148 can be connected to the ITCN middleware servers 20. Also included in the telephone box 148 are facilities for making telephone calls (i.e. a microphone, speakers and a connection to a telephone network), a television screen 150 for viewing television content, a keyboard 152 for typing in telephone numbers or other text and a video camera 154, the output of which can be sent to the ITCN

middleware servers. An advantage of the telephone box 148 is that members of the public who want to access the ITCN can do so, even if they do not have the necessary equipment at home.

Figure 2 also shows a connection to internet content and various other portals, such as digital content sites.

Whilst the system of Figure 2 shows an infrastructure that is based on a communications network having optical cables, it will be appreciated that other communications platforms and networks could be used. Figure 4 shows a portion of the ITCN that is designed to operate across a hybrid fibre coaxial environment, which is ideal for delivering both interactive and television content. In this, three cable subscribers are shown, each having some form of cable set top box 166 that is operable to communicate with a cable content supplier 168 across the HFC network 170 via a series of routers and switches 172. Included at the cable provider head end 168, there is a middleware server 174 that has software for controlling ITCN functionality and a client server 176 for controlling other system applications. Each of these is able to communicate with an application module 178 and 180 in a local ad insertion facility 182 and a video on demand application server 184. As before, the function of the local ad insertion facility 182 is to provide regional video content, preferably in the form of regional adverts. The video on demand server 184 contains a store of all of the video content available from the cable television provider. This may also include information on the content available from other providers.

Each of the video on demand server and the local ad insertion facility 182 and 184 respectively is connected to a multiplexer 186 via a high bandwidth cable

188 that is in turn connected to a router 190 that is able to direct out-going signals to the cable subscribers. Also connected to the multiplexer 188 are an antenna 192 and a satellite dish 194. In this way, content from satellite or terrestrial television providers can be received and processed, if necessary, and re- transmitted via the cable network to cable subscribers. Also provided at the cable provider of Figure 4 is an operational support system 196 for controlling such things as billing.

Figure 5 shows an example of how a satellite content provider 200 and satellite subscribers 202 could be connected to the ITCN. In this case, the home users' terminals include a satellite dish 204 for receiving television content and a set top box 206 for receiving interactive data. Each of the set top boxes 206 shown is connected to a DSL modem 208. Connected to the modem 208 is a series of switches 210 with DSLAM access, which are in turn connected to a multiplexer 212 in the television provider end head. Connected to the multiplexer 212 are a video server 214 that is able to access video content, such as MPEG video content, and a local advert insertion application 216. Included in each of these is an application module that has software for performing some of the system functionality. Also provided is a satellite transmitter 218, so that content can be transmitted and received via a satillite link to the home user's satellite dish 204. Typically, television video content is sent via the satellite transmitter 218 and interactive data is sent via the optical cable. However, this is not essential and the interactive data could be sent via the satellite 218 to the user's satillite dish.

In use, if a satellite user of the network of Figure 2 wants to receive television content from the cable television provider, a request signal is sent from, say, the set top box 68 to the DSL modem 74 via the optical cable to the router 24 in the

head end. Included in the request signal is data that is indicative of the source of the request, e.g. a user identification number, and information on the content required, ie. the cable content required. When this signal is received at the router 24, it is recognised as a request that has to be directed to the ITCN middleware servers 20. The signal is then directed to the middleware servers 20, where it is interpreted to determine the nature of the request, in this case a request for television content. Since each user of the system is registered with the ITCN, the middleware servers are able to use the request signal to identify the user, the nature of the user's receiver equipment, in this case a satellite set top box, and whether the content requested is provided on a network that can transmit directly to the user's receiver.

At this stage there is a clearly defined path between the middleware servers 20 and the end user 68, which means that there is a clear route along which the video content can be transmitted. In this case, the ITCN identifies the source of the television content requested as being the cable television provider and transmits a signal to the cable television video manager 28. An instruction is then sent to the video server 32 to transmit the cable television content through the multiplexer 30 to the QPSK/MPEG encoder 36. The video content is then compressed and sent to a satellite transmitter for transmitting directly to the user's satellite dish. It should be noted that the satellite transmitter could be provided at the cable television provider's facility or could be the transmitter of a satellite provider that is also connected to the ITCN, such as shown in Figure 5. Alternatively, a dedicated satellite transmitter could be provided at a central ITCN broadcast facility.

At this stage, it may also be necessary to send a signal to cause the user's television receiver 68 to switch channels to the channel on which the video content is being transmitted. The channel would of course be changed prior to the content being broadcast. Alternatively, the signal tranmsitted from the satellite could be changed to a frequency and channel, which matches that of the television receiver, in which case it would not be necessary to change the channel at the user's receiver. In either case, ultimately, the satellite subscriber can access television content provided on a cable television network, without having to have a cable television set top box. This is advantageous.

Whilst it is said in the above example that the television video content is transmitted via a satellite transmitter to the satellite subscriber's television 68, it will be appreciated that it could be transmitted via the ADSL loop 76 that connects the satellite set top box 68 to the head end router 24.

As will be appreciated from the foregoing description, the ITCN is operable to receive and process many different types of content, whether video or otherwise, from many different sources of that content, such as satellite content providers, cable content providers and internet service providers etc. By joining the ITCN, each of the content providers makes its content available to users, regardless of the nature of the user's hardware. Hence, when users join the ITCN, they are able to receive broadcast content from any data source. This is done by transmitting the television content to the user in a format that can be received and either adapting the frequency that the user's terminal device receives the content on or altering the carrier of the content so that it can be received on an existing frequency provided by the network to which the user subscribes. In either case, the ITCN enables all devices to connect to all

frequencies across all networks whether through CATV, DTT or DSS via a mobile phone, PC or TV.

This means that the ITCN creates not only an extensive single television platform, but also an extensive internet based platform for commerce and interactivity. In this way, it can be seen that the ITCN operates in a tri-directional environment through a multipoint configuration, in which many data centres of different types are connected to the same line. By tri-directional it is meant that the ITCN can work across television networks, internet networks and mobile phone networks. An advantage of this is that regardless of their terminal, once a user joins the ITCN they have access to content from any other type of source, provided the content supplier is also a member of the ITCN. Content is then controlled by a primary server/computer, i.e. the ITCN server, and the data centres (ie DSS, DTT, CATV stations) attached to the line are secondary.

A further advantage of the ITCN is that service providers can open up their services to user who would otherwise not have the capability to access them. This means that service providers need only have a single content site as this could be accessed by many different users, regardless of the medium the service provider chooses for the site. Under conventional circumstances, only users having access to the internet could enter the site – users with access to a cable television network would not be able to enter the internet web site. To overcome this problem at present, service providers are obliged to provide content sites on many different networks. It is not uncommon for service providers to have a digital site and an internet site and a WAPP enabled internet site. However, this situation is inconvenient and expensive, particularly when

information on the services has to be up-dated, because the service provider has to co-ordinate the up-grading of a plurality of different sites. Using the ITCN, however, users may access the content site from a multitude of different networks, so avoiding the need for service providers to have separate or distinct sites on a plurality of different networks. This is highly advantageous.

In order to navigate around the video content available in the ITCN, a text based search engine is provided. This software is able control the transmission of information across various channels for example the QPSK, which is used for transmitting interactive data, and the QAM, which is used for television services. In order to implement the search engine, associated with each content provider is a database or some form of store that contains details of all current and forthcoming adverts/programs that are being or will be broadcast on their channel. In the example of Figure 2, this database would typically be stored in the video on demand servers at each content provider. Alternatively, the text-based details of the content could be embedded directly in the video content itself, therefore, eliminating the need for a database.

Stored with the program information are program identifiers that indicate the number of the program, the channel on which it is to be broadcast or transmitted and the frequency of transmission. This information can be stored locally at the broadcaster location or alternatively in a central database, together with similar information provided by other broadcasters. Stored with the program information are markers that can indicate the products that are included in or are the subject of the broadcast and/or the category of the program, for example news, sports, financial, etc. In the case of products, the stored information could relate to various product attributes, for example, colour, price, size and

style for clothing items and year, colour and model for cars. The search engine is operable to search the content databases for video content on specified products or services or program categories.

In order to allow the user access to the search engine, a GUI is provided. This can be generated by an application provided at the user's terminal or by the ITCN middleware servers 20 of Figure 2. When the user turns on their television receiver and set top box, the set top box scans its downstream channel to make sure that it is synchronised or connected, thereby to enable it to communicate with the television provider. If the user is registered with the ITCN, he is then presented with several options, including an option to search for video content. These options could be presented automatically by the local application or upon a request that is sent from the user terminal to the ITCN, from where the options are downloaded. If the user selects the search option, the search GUI is presented.

Figure 6 shows an example of the GUI 220 presented to the user. This could be adapted to fill the entire television screen 222 or alternatively only partially overlay the currently viewed television content. The GUI 220 has a data entry field 224 in which the user can enter text that is to be the subject of the search, for example, the user may wish to search on "Eastenders".

Once the text is entered in the GUI 220 and the user has confirmed a request for a search, by, for example, clicking on the prompt 226, a signal is sent through the network to the ITCN middleware servers. Once the signal is received a bi-directional communcation path is set up between the user and the middleware servers 20. The middleware servers 20 interpret the request from the user to

identify the functionality, in this case a search request. The request is then forwarded to the relevent search application, which identifies any sources of video relating to the text-based request by searching the content databases. This gives an indication of what the set top box needs in order to receive the content, for example, the channel number and the frequency. Once the search has been completed, the results are transmitted back to the user terminal. The results are then presented, typically, in the form of a text list as shown in Figure 7, each entry of the list being selectable by the user. Transmitted with the information in the list that is presented to the user are the channel number and the frequency of the signal that contains the video content.

The user can view the results and select the video content of interest. At this stage, the software may be operable to present the user with the option of viewing the television content immediately or scheduling a time at which the content is desired. In addition, the application is operable to allow users to select on which of their devices they want to watch the program. In this way, the ITCN is provided with information on the format of the content that is to be transmitted to the user's terminal.

Once the user has made the desired selections, a signal is sent back to the middleware servers 20, where the source of the content is identified. A signal is then sent to the content provider either immediately or at the chosen time, requesting the selected content. Once this is received, a signal is sent to the user terminal to cause its receiver to change to the required channel and the video content is transmitted from the television content provider. It will be appreciated that the command to change the receiver's channel could be sent from either the ITCN middleware servers or directly from the content provider.

In addition, it will be appreciated that if the selected video content is already currently being transmitted, there is no need to transmit the video content again, instead the channel at the user's terminal is merely changed. Of course, to do this, the middleware server has to be aware of what is happening at the content provider. Furthermore, should the video content be provided by a content source whose television signals the user cannot receive, the content will be processed and transmitted to the user in a format that their equipment can receive and display.

The video is then displayed either immediately, if it is being currently broadcast, or at the time of broadcast, if it is being broadcast at a later time, or at a time that can be scheduled by the user. Hence, the user is able to search for and obtain video content in real time. In this way, the user has access to video content on a specified product or program that is available across the ITCN network. In particular, because of the network facilities provided in the ITCN, the user can search for and receive to video content from television content providers that he does not subscribe to or have the hardware to receive at home.

In addition to searching the content databases described above, the ITCN search engine is operable to search the main internet and provide internet content to the viewer. This has the advantage that the system is readily scalable.

The search application as described above has many distinctive characteristics in its ability to control channel transmission, video transmission and audio transmission through a graphical user interface. In particular, it provides a dynamic method of content distribution, video on demand and channel switching techniques that is pre-dominantly dictated by up-stream requests for

video from home users. Using techniques such as multicast, the application is operable to transmit content across multiple set top boxes without restricting scalablity.

In order to further faciliate access to television video content, the ITCN includes a navigation system, which uses standard browser software. As is standard, content that is accessible via the browser is allocated a domain name server address of the form "www . com. co. uk". However, in order to facilitate access to television content such as programs and adverts, content is allocated an address of the form:

www . com. co. uk. Fr

where "www . com. co. uk" represents the domain name server, i.e. the normal internet or digiat content address and "Fr" represents the channel frequency (Fr) of television video content relating to the web or digital site.

When the user types in www.com.co.uk, the application generates two prompts, one saying, e.g. click here to go to the web site and the other saying click here to see the video content. Once the user makes his selection the application either sends out a request to the relevant data centre to display the internet web site or independently tunes the user's receiver to the frequency, which is contained within the data string of the www. address, in order to access the video content. Once the relevant frequency is selected, the user is presented with the required television program or advert. It should be noted that this frequency may also be automatically activated when a web page is opened, so that a request is sent to a relevant digital television data centre for the broadcast

content to be directly transmitted to the user. As before, this content can then be displayed on any given device that is able to interpret the frequency and receive the transmission.

The navigator provided in the ITCN could inlcude an interactive TV program guide for enabling users to find broadcast content by searching for www. content and broadcast and video content stored at the data centre. The interactive program guide may be operable to allow the user to purchase goods from interactive television programs or adverts, select what they want to watch at home on television, schedule pre-pay movies, configure a weekly watching schedule from a mobile teleohone, television or PC. The guide stores the frequencies of all channels in a library and provides access to all networks via the ITCN, regardless of the hardware that is provided at the user terminal.

In order to facilitate the addition of material that can be searched using the search engine and the browser, a graphical user interface is provided at the operator end of the ITCN. This is adapted to enable content providers to place television programs and/or adverts and/or interactive adverts and/or interactive programs within the search engine. An example of a suitable GUI is shown in Figure 8. This has data entry fields for the following information:

(1) the address of the content;
(2) a content identifier – usually selected by the provider;
(3) a start time of the content, including date and time;
(4) a stop time for the content;
(5) an indication of the subject matter of the content, e.g. christmas toys; action man; pokemon, etc

The details of each content provider, such as the frequencies on which they broadcast and available channels, are known to the ITCN and accessible by the search engine.

Using the information entered in the data entry fields of Figure 8, the search engine can add the new program or advert to a database of content that is available. The software is operable to display a GUI with a summary of the contents of the search engine database, as shown in Figure 9. This GUI has a column for the frequency (in GHz) on which the content provider transmits and the transponder number (shown in brackets with the frequency), an indication of the format of the television image (e.g. the POL format), a channel identifier and the start and stop times at which the content will be broadcast. The channel details can be stored within application modules at the head end or in any other form of data storage at any appropriate location. The application is adpated so that by clicking on a line of the GUI of Figure 9, the details entered in the GUI of Figure 8 can be viewed.

The software is operable to allow information in the search engine database to be altered, e.g. a video placement could be suspended by the provider. This could be done, for example, if live coverage of a sports event were to over run and the broadcaster did not want viewing to be interrupted by the incorrect insertion of an advert. The software is also adapted to allow the broadcasters to let users have access to the video material on demand, as an alternative to at the scheduled time. Of course, this will not always be possible. Other features are provided to allow television content providers to readily edit their entries, such

features including facilities to delete or edit an entry, and copy, cut or paste entries, thereby to speed up the process of entering multiple similar entries.

Once information on the available content is entered into the content database, the search engine is able to search for it. In this way, user's of the ITCN can search for and obtain information on available video content from a wide variety of content providers. Since the ITCN has the potential to provide access to content from a large number of providers, this means that the chances of a user being able to find what they are looking for greatly increases. For example, the user may ask the search engine to find out when the next showing of "Star Trek" is available. The search engine would then search its databases to find out when the next showing, and optionally, subsequent showings, are going to be available. The search engine also searches video content, such as MPEG 4, that has text content embedded in it. The search results are then provided to the viewer, together with options as to when the content can be viewed. Of course, it may be that the desired episode of "Star Trek" is available to the viewer on demand. In this case, when the content is found, a prompt is sent to the user asking if they want to view the program now. If the answer is yes, the video content is transmitted from the broadcaster to the user immediately. If it is determined that the user has equipment that is not compatible with the broadcast format provided by the content provider, the transmission is re-formatted at the broadcaster location or at the ITCN location and then transmitted to the user in a format that is suitable for reception by their equipment.

As a more specific example, if a cable user of the system of Figure 2 were to perform a text-based search from their television, a search request would be

sent to from the set top box 48 to the local hub, through the system backbone to the head-end router 24, from where it would be directed to the ITCN middleware servers 20. At this stage the middleware servers 20 would interpret the signal, conduct a search of the content databases (e.g. the video on demand servers of each of the content providers 22, 84,86 and 88) and send a request along a search path to the source of the video content, i.e. the video servers or local content database.

The search results are then presented to the user, who is given the option to select television content for viewing. When the user has made a selection, a request for the content is sent to the middleware servers 20, which send a request along the search path to the source of the video content. Because each of the user and the content source are identifiable by the system, at this juncture, a clearly defined transmission path is established between the set-top box 48 and the video content source. This path may be defined by the unique IP address of the set top box or other user terminal. The application then causes the television content to be transmitted to the user, together with a control command for causing the user's receiver to tune to the channel and frequency of the transmission. Once the command signal is received at the user's set top box 48, the receiver is automatically switched to the desired channel and the user is immediately presented with the television content originally requested.

As will be appreciated, the ITCN provides users with the possibilty of viewing content from a plurality of different sources, regardless of whether or not they subscribe to the services provided by those sources. In order to ensure that the content providers receive payment for services, the ITCN inlcudes a subscription application, DCSR, for allowing users to subscribe to other

television networks from their existing network. The application is designed to allow users to pay additional subscriptions and view content in a real-time sense. The application could prompt a user during a program or advert on content that is being transmitted from their existing network operator's data centre, giving the user the ability to receive content from another network or channel. Alternatively, the user could of course access the content via the search application. If a user decides to cross to another network provider, the system application is operable to present a prompt notifying the user that they are transferring to another network and that this incurs a DCSR fee. At this stage, the software generates various prompts giving the user the option to select no or a demo of the content or select yes and pay small subscription fee. If the user selects "yes", a credit check is done against the user's account. If the credit check is positive, the user's receiver is tuned to the relevant channel and frequency and the video content is then broadcast directly to the user and their account is debited by the required amount. Alternatively, a charge could be added to the user's account and the user invoiced at regular intervals, e.g. at the end of the month.

By allowing users to pass through to other networks, the ITCN and DCSR allow cable television providers and satellite television providers to gain additional revenue in content-subscription. For example a user might perform a search using the ITCN to find a movie of interest. The result could be a pre-pay movie on another network whereby a minimal fee may be payable for transferring across networks based on the length of time of the content. This is important as costs may be incurred by network operators to allow users to network hop. The advantage of this system is that television network operators have the ability to

expand their user base rapidly and effectively can take advantage of additional flexible subscription based fees, which provide them with new revenue streams.

The DCSR provides a flexible subscription system to allow users to access to other content across all broadcasters, regardless of whether they have Digital satellite television, digital cable television, digital terrestrial television or analogue. Content could, however, be restricted to primary based subscribers. This allows television network operators to restrict secondary subscribers from viewing selective content that is only accessible to full subscription viewers. Access to selective channels and content can be restricted through encryption that can only be decrypted after a user has subscribed to the relevant service.

According to another aspect of the invention, there is provided an interactive television and e-mail system that allows viewers to capture links to television content. This can optionally be implemented on the ITCN. For the sake of clarity, however, it will firstly be described in a single television platform environment, as shown in Figure 10.

Figure 10 shows a video server 230 and a plurality of user terminals 232 that are connected via a telecommunications network 234, such as a cable television network. Contained in the video server 230 is television content that can be broadcast or transmitted to each of the user terminals 232. The television content can be recorded content that is part of a video on-demand library and/or a store or library of recorded television content that has been recently broadcast in real time. The data server could be maintained by the television broadcaster or alternatively by a service provider that collates and stores the television content on behalf of the broadcaster.

Each user terminal 232 of the system of Figure 10 comprises a television or a PCTV 235 that is operable to display real-time television content, such as programs and/or adverts. When the user terminal 232 is a television, a set-top box is typically provided to enable the user to access, for example, cable television content.

Included in each of the user terminals 232, either in the set top box or in the PC, is a software application 236 that allows a user to send and receive e-mails whilst watching television. The technology for implementing this is well known and so will not be described here in detail. In addition, software is provided to allow a user to select at least a portion of a real-time television broadcast or currently viewed video content for viewing at a later date or sending to another user in the network via e-mail. To do this, the video content of each television broadcast is stored at a defined location or address in the data server. Each program transmitted by the original television content source contains the frequency of the channel transponder, the channel number, the time of broadcast, the video source address (i.e video server) and details on the length, format and content of the video.

When a user wishes to capture a portion of a broadcast program for viewing later or for sending to another party, a link to the data server address is created. This link can be created whilst the user is watching a television program by presenting a prompt asking if the currently viewed program or advert is to be captured. Alternatively, menu tools in the e-mail application could be used or content could be selected from an interactive program guide that operates as a stored library of links to programs. For example, the user software may be

operable to present a user menu 238 that allows the user to select a "capture link" option, as shown in Figure 11. When this is selected, a GUI 240 is displayed, which includes a start icon 242 for allowing a user to define the start of the portion of the program that is to be captured and a stop icon 244 for allowing the user to define the end of the desired portion.

When a desired portion of the television content is selected, the link is defined by the software, which link includes information that identifies the program; defines the limits of the selected portion of that program and the address of the program. This is done using the information that is provided with the television content. For example, if the user selects a portion of Coronation Street on ITV2, the link would:

(a) identify Coronation Street as the program,

(b) identify ITV2 as the source

(c) identify the address of the recorded version of the broadcast in the video server, and

(d) include information on the start and stop points of the selected portion of the program.

The link is then stored in a memory or data sink at the user's terminal. The memory could be, for example, the hard disc of the user's PC, the simm/memory of a mobile phone or the digital set-top box memory or hard disc.

Once the link is stored it can be used to allow the user to retrieve the associated video content for viewing and/or sending to another party and/or importing into

another document. To this end, the GUI that is generated by the software in the user's terminal is operable to present the following options:

Export link

Import link

Send link

An edit link option is also provided that allows the user to edit, for example, the time period over which the link extends. As yet another option, the software may allow the user to select the speed at which frames are presented to them. This can be done by sending a signal to the broadcaster requesting that the transmission rate be altered or the video content could be cached at the user's terminal and then displayed on screen at the selected rate. This is advantageous, because the user may want to slow down the frame speed to provide a better view of a product that is the subject of an advert. As a yet further option, the application may provide the user with the option to rewind or forward the content being broadcast in real time. To this end, forward and rewind icons 246 and 248 respectively are presented as part of the GUI. The technology for forwarding and rewinding is available, but will not be described in detail in this application. The various options are shown in the drop down menu and icons of Figure 11.

When the export link option is selected from the menu, the user is asked to identify the document to which the link is to be exported. It should be noted that this option is available to users who have television terminals that include or are able to communicate with word processing facilities. Once this is done, the link is then automatically included in the identified document. When the

import link option is selected, the link is automatically included in the document or video content that is currently being viewed or used.

When the send link option is selected, the user is asked to select the link that is to be sent. Once selected, the link defined by the user is automatically appended to an e-mail or a text based message and sent to a specified address in the network. When the e-mail is received at the desired addressed and opened, the receiver is presented with a message and an attachment.

Figure 12 shows an example of an attachment. This is a "thumbnail" that shows a still portion or animated frames of the video content 250 that the link is associated with, together with an indication of the duration of the video content, the nature of the content and the source and the date it was captured. Overlying the thumbnail is a "click to view" prompt 252. By clicking on this, the user can elect to view the associated video content. If this is done, software in the receiver terminal is operable to identify from the link the program selected, its source and the portion of the program that is to be displayed to the receiver. In addition, the receiver software is operable to identify the data server in which the broadcast content is stored.

Once the relevant data server is identified, a query is constructed within the receiver's software application requesting that the selected portion of video content be broadcast to the receiver terminal. This query is then sent to the relevant video server using the information contained in the link, for example, the video server address or frequency and channel number. On receipt of the request, the video server identifies the user's e-mail string and a handshake is performed to acknowledge that communication or data transfer can take place

between the data server and the receiver terminal. Once the handshake is completed, the library of broadcast content stored in the data server is searched to find the selected television program. This can be done by searching on the broadcast source, e.g. ITV2, and the television program title. Alternatively, the stored television content could be classified using a numbering system. In any case, once the selected broadcast content is identified, it is automatically broadcast to the receiver terminal. In this way, a portion of video content that is being currently viewed by a first user can be sent to pre-determined recipient, who can then view the selected portion of the program. It should be noted that it may be necessary to send a command prior to the broadcast of the television program for causing the television receiver at the recipient's terminal to change to the channel on which the television content is being broadcast.

In the example of Figure 10, there is only one data server. However, it will be appreciated that a plurality of data servers could be provided, each having a unique identifier that identifies to the receiver terminal where it is located. In addition, a link could in fact be adapted, using, for example, the editing option include links to video content from other sources. In this way, a user could in effect prepare a video compilation using content from different source

An advantage of the system of Figure 10 is that the link file size requires minimal bandwidth as the attachment is in effect data for identifying the video server. Once this link is selected, however, television video content is transmitted or broadcast directly to the user over the television network.

It will be appreciated that the foregoing system could be adapted to create links to radio content. However, once the link is selected, it is radio content that is

transmitted directly to the user. As before, it may be necessary to change the channel of the user's radio receiver by sending an appropriate command signal, prior to receipt of the transmitted radio content.

By using the ITCN, the relatively simple system described with reference to Figure 10 can be extended to provide users with the ability to store links to TV programs and advertisements from many different types of content source across many different television networks. The TV programs are provided across a plurality of television networks, for example, digital cable television, digital satellite television, interactive mobile telephones, etc. In particular, the ITCN enables users with, for example, cable television equipment to send a link to a cable television program to a user with only satellite television equipment. Of course to do this, a data server would have to be provided in order to store the video content that is broadcast.

Figure 13 shows a first user terminal and a second user terminal, each of which is connected to an ITCN infrastructure. The first user terminal includes a satellite television set top box 270, but not a cable set top box. The second user terminal includes a cable set top box 272, but not satellite set top box. In order for the first user to send a link to video content provided by the satellite television provider, a link must firstly be defined. As before, the first user selects the portion of the video content that is desired. The relevant link is then created, which link contains the address of the original data source containing the broadcast content, in this case the video or data server of the satellite television provider 274, and the number of captured frames specified by the creator of the link. The link also typically contains the frequency setting for the channel, e.g. 12.031 GHz, the transponder node and channel address, e.g. 663.

Once the relevant link is created, it is attached to an e-mail 276 and sent to the second user via the ITCN network or any other suitable network. Of course, the e-mail 276 could be sent to multiple recipients using an e-mail filter. When the e-mail is received and the link is selected for opening, a signal 278 is sent to the ITCN hub. This signal 278 includes the following information:

- the second terminal's unique identifier
- details of the video content defined by the link, e.g the address of the video server containing the broadcast content, the number of captured frames specified by the creator of the link, the frequency setting for the channel, the transponder node and the channel address.

This signal 278 is interpreted to determine the location of the second terminal 272 and the nature of that equipment, e.g. in this case, a cable set top box. A direct communication link is then set up between the second terminal 272 and the ITCN. Once this is done, the software application in the ITCN searches for the desired video content, which is provided by the satellite television provider. By using a database or video library which stores links at the broadcasting point of the broadcast source, the application is able find the exact location of content identified within the e-mail attachment. When the selected video content 280 is found, it is processed and transmitted directly to the second terminal 272 in a format that is suitable for receving and viewing at that terminal, in this case, a cable format. As before, it may be necessary to send a command prior to the broadcast of the television content for causing the cable television receiver 272 to tune to the channel on which the content is being broadcast.

Once the broadcast content is received at the second terminal 272, the user is presented with the option to view video content now or schedule when they chose to watch the program at a later time. In this way, the first user is able, in effect, to send video content that is provided by a satellite television service provider 274 to a second user who only has a cable set top box 272.

Using the ITCN enables users to send e-mails that include video content to any recipient regardless of the receiver's device whether they use a digital satellite television, digital cable television, digital terrestrial television, mobile phone or PC. In this way, users can send and access content from any source whether from a digital satellite broadcast video, or cable, terrestrial, analogue or even a radio station using radio-on-demand. Furthermore, the ITCN allows user to send e-mails across all television networks and internet networks, thereby providing enhanced channels of communication for businesses and users. In addition, whilst the video content that is sent by means of the e-mail link may be merely video content, it may also contain interactive prompts that were contained in the original video content or were imported by the sender. The interactive prompts could, when selected, automatically link the recipient to, for example, a digital information site, a web site, a multi-content site that provides both television and internet or digital content, an intranet, an extranet, a video conferencing facility and even links to other video content.

Included in the broadcast content that is sent to the recipient of an e-mail could be interactive prompts. These prompts can be included in the video content by the broadcaster or the sender of the e-mail. In order to allow prompts to be imported into a linked portion of selected video content, the application provided at the user's terminal is operable to display a menu that shows the time

sequences of the selected video. An "import prompt" marker is provided on screen, which marker can be dragged to a selected a time at which the prompt is to be imported. The user is then asked to define the prompt they require and the relevant information is entered, e.g. a link to the user's own web site. On confirmation that the information entered is correct (for example if the user presses ok), the prompt is then stored and set to go off at the specified time during the video playback. When the recipient subsequently watches the video they are presented with a prompt at the specified time/frame during the video to go to the pre-defined location, whether it be a digital site, web site, multi-content site, intranets, extranets, video conferencing etc.

By providing users with the ability to reach other video content programs /adverts from the video content that is e-mailed to them, it is possible to expose them to additional material thus increasing the opportunity for a sale. For example, including prompts in video content would enable businesses to send targeted users interactive television adverts via e-mail, together with a "purchase" prompt, which enables them to purchase goods or services. This is advantageous to businesses as they can enhance their revenue streams through targeting consumers and retaining existing consumers by keeping them informed of their latest products and services. Alternatively, businesses could send e-mails to other businesses with an attached interactive TV program that contains prompts to their web site or intranet or extranet. For example, a business could send financial news on its activities or progress that was shown on the 6 o'clock News to other businesses so that they are made aware of its recent successes. Equally, companies could send TV news clips to customers informing them of the failures of competitor companies on the stock market. Imported into the news sent could be a prompt for automatically linking the

receiver's terminal to the sender's web site. Of course, the sender of the e-mail can be an individual user or a business

Using the above-described systems users can store links to video footage, which links can be sent to other parties or viewed. This is advantageous because it gives the user the ability to send video content at a later date when desired and use content for various different means. For example, rather than sending a link to another party, a user could merely save it for later use or could incorporate it into a text document, e.g. a spreadsheet or a database or a picture document or any variation or combination of these. This is advantageous as it enables users and businesses to enhance the presentation of documents they create by supplementing them with video content. Presently, this is not practical due to the size of video content files and limited bandwidth on the internet and interactive TV. However, by providing interactive links the broadcast content becomes, in effect, part of document, which has been created by the user. As before, however, the content is not available until the user opens the document or prompts an attachment, which causes an instruction to be sent out to the appropriate data source, i.e. the server or device containing the content. On receipt of the instruction, the video content is then transmitted to the user. It will be appreciated that to benefit from the advantages of this facility the document would have to be opened in a system that has television receiver capabilities and the channel to which the user's television receiver is tuned may have to be changed, depending on the television channel that the video content is transmitted on. This would, of course, be done automatically before the video content is transmitted.

As described previously, the content that can be accessed via the linking technology could be directly taken from real time programs and adverts that are broadcast on TV. In addition, content can be directly inputted from the user's own stored content by connecting up a video recorder or dvd recorder or camera device, as shown for example in the corporate site of Figure 2, and then attaching or inputting the content into the document. The content could also be sound or radio broadcast. Alternatively, the user could broadcast their own content to an ITCN server, which then stores the content until prompted by a recipient of the document. When a document is opened, the server directly broadcasts the relevant content to the recipient.

As will be appreciated, documents that include links to other content, e.g. video content, may be sent via e-mail or exchanged on a network or stored on a data storage device whether DVD, CD, VHS, Floppy Disk, Hard Disc, Removable Disc etc. In addition, the video content in documents can be edited to contain prompts that can take the reader to areas contained within the document that are of particular interest. In addition, prompts could be embedded in the document text, which prompts are operable to be displayed when a user scrolls past a pre-selected portion of the text. For example, a prompt may be embedded in page 2 of a text document. When a user scrolls past page 2, instructions in the user application cause the prompt to be generated. This could say, for example, "further video available" or "click here to be connected to a web site". When a user clicks on the prompt, the pre-determined video content or web site is transmitted to the user's terminal.

In order to change digital video broadcast format to Quicktime/ AVI/ MPEG/ R2, the user's terminal may include dedicated software. In this case, the user

can specify either before or after the content is broadcast the format in which the content is to be displayed. This enables users to use different applications to view and edit documents. In addition, is means that content can be recorded and translated into formats other than DVB and DTT.

In the scenarios described above, the video content that is attached to the e-mails is merely a portion of video that is broadcast on television. However, the attachment could be a DVB of a product interaction. An arrangement for providing this will be described in more detail later, but generally this comprises an interactive video of specific products is broadcast or streamed to users. In order to take advantage of this feature, software is provided that is operable to receive control commands from the user to cause the product to rotate or be moved or to allow the user to view inside the product etc. Hence, businesses could e-mail links to interactive product video content that enables users to visually see, interact with, hear and in effect feel a product. Of course, an interactive "purchase" prompt could be included in this video content to enable the viewer to purchase the product or service.

An advantage of the link system described above is that video content that includes links can in effect be constantly up-dated. This is because the video content in the data centre to which the link is directed could itself be changed. However, these changes in content can be done automatically without the user's interaction or by the users prompting additional content. This means that when a user watches, say a DVD or VHS that has a link, the content may be different, because the links may cause different video content to be downloaded to the user's terminal. This provides opportunites for advertisers, because adverts can be changed within seconds.

Whilst the above features are described with reference to video content, it will be appreciated that most of the features could be used to create links to access radio content from a radio data centre, such as that shown in Figure 2, thereby providing a radio on demand (ROD) service. In addition, provided a user has access to radio that is connected to a screen, such as a radio in a television, a user can be presented with prompts in a radio broadcast to connect to an internet web page. On responding positively to the prompt the user's terminal would be automatically connected to the selected web page.

Another aspect of the present invention is an interactive video conferencing system. This can optionally be implemented as part of the ITCN. In this, each user has a video camera and microphone connected to their television terminal. Figure 14 shows a simplified view of the ITCN of Figures 1 and 2, in which the user terminals 282, such as a digital satellite box,a digital cable set top box, an analogue internet television, a PC and a mobile telephone, are provided with video cameras 284. These could be provided separately from the user terminals, for example, by plugging a camera into the USB port on the terminal, or formed integrally therewith. The mobile telephone is described in more detail later.

In addition to cameras 284, each user terminal includes software for allowing a video conference call to be initiated. This is done using a prompt 288 that can be displayed during a real time television program or advert or in a digital site or an internet web site or multi-content web page or whilst watching video on demand or a recorded program or advert, as shown in Figure 15. Included in the prompt is information on a pre-determined address or location of a video

conference line. When the prompt is selected by, for example, the user clicking on it, the software switches on the microphone and camera at the user's terminal and opens a two-way audio-video communication line with the pre-determined address, as defined in the prompt. A signal is then sent to the location defined in the prompt, usually the advertiser, which signal contains details, such as the location, of the user who wishes to establish the video conferencing link. The originator of the prompt then transmits or downloads audio-visual content via their camera and microphone to the user's terminal, where it is displayed and a point to point video conference channel is opened. The video conference picture could be arranged to completely fill the user's screen or alternatively partially overlay the currently viewed television program. Hence, a video conferencing line can be established to enable the user to see and converse with the sales person. In this way, advertisers can provide interactive prompts during television adverts, which when selected automatically provide a video link between the user and a sales person. Hence, the user can purchase products and services whilst video conferencing. In addition, interactive prompts could be downloaded to the user during a video conference call, thereby to allow them to purchase products.

The arrangement described above allows a two-way point to point video conference link to be established. Some users may, however, not be comfortable with a third party being able to see inside their home. Hence, if desired by the user, their home camera could be switched off, so that the conference link is two-way for audio, i.e. spoken, communications, but one-way for video conferencing, i.e. the user can see and talk to the sales person, but the sales person cannot see the user.

In addition to providing prompts during television programs etc, software is provided at the user's terminal for sending video conferencing links as attachments to an e-mail. In this case, when the user clicks on the video conference icon, the application in the recipient's terminal automatically takes steps to set up a video conference line. Contained within the video conferencing link could be an interactive prompt to enable to recipient of the e-mail, for example, to purchase a product on-line. As with the link attachments, the video conferencing attachment could be a DVB thumbnail and/or a still and/or animated illustration of broadcast content.

Users can accept or exclude parties from entering a video conferencing call by selecting users and either barring or putting them on them on hold. By putting other users on hold during a video conferencing call you can accept other video conferencing calls coming in privately. The user has ability to resume the original video conferencing call once they disconnect with the incoming call, which they diverted to. During a video conferencing call, users are alerted of incoming video calls, which will be presented on their screen only. The user may opt not be alerted by a sound and just text. Users can also specify to bar/divert all other incoming calls when on a video conference call this is important as users might not want to be disturbed. If the divert video calls then video messages will be stored on their video messaging service, which they can retrieve at any time using a number of alternative devices whether PC, TV, Mobile.

As will be understood the video conferencing system can be used on discrete networks, for example, over a cable television network. Alternatively, users could set up a video conference with other users over the ITCN. This means

that a party at home could use their television to set up a video conference with someone in an office who has access to a PC. In addition, mobile telephones could be specially adapted to allow their screens to display television content. This gives users the freedom to move around and provides greater accessibility to communication. Users could then take part in video conferencing calls from their mobile phone, whilst abroad on business in any part of the world. Video conferencing content can also be transmitted as a broadcast across networks to users for increased speed and quality.

In addition to establishing video conferencing links on demand, the video conferencing software is operable to establish interactive video conferencing links at specified times. For example, the system could be configured to call a friend or relative once a week at pre-determined time or every day at a particular time. This is advantageous.

Using the interactive video conferencing system described above, enables users to take part in, for example, live television broadcasts. Hence, users could join in programs as contestants in a game show. To do this, an interactive prompt is presented on screen that says "click here to take part in show". This prompt could be part of the broadcast or generated by a display generator in the user's television receiver. On receipt of the prompt the user's terminal is primed to receive a response and is able to identify the television source. If the viewer clicks on the prompt, the user's video conferencing software automatically causes a link to be established with the television broadcaster. Once the link is established video signals are then up-streamed to the broadcaster's data centre from the user's camera. Alterntaively, the user terminal could be provided with a transmitter in which case, the video signals could be transmitted to the

broadcaster's data centre. Software provided in the data centre causes the incoming signals from the viewer to be merged with the video content that is being broadcast. The merged content is then broadcast over the entire network. In this way, by streaming data from the user's camera to the broadcaster, the user can take part in the live broadcast and can be seen from their home by other viewers watching the television program.

In order to allow the user to interact with the television program, the keys on the remote control of their television could represent interactive buttons, which relate to answers in the TV show. For example a user could be presented with questions like "Who is the president of the United states?"

1 Bill Smith, 2 Bill Gates 3 George Bush

The user would then press the number of the answer, which he believes is correct on his terminal keypad. A signal indicative of the selection is then sent to the broadcaster. In this way, a user can interactively take part in live television broadcasts.

In addition to facilitating the video-conference link, software in the user's terminal is operable to allow for the selection and presentation of electronic documents and/or video content in part of the screen during the video conferencing. This is a useful tool as it enables users to view and discuss documents or video footage during a conversation. In addition, it enables users to exchange or transmit documents and video can be captured from other users.

As well as joining live television broadcasts, by having a camera and broadcast equipment at their premises, users can join an interactive video chat room. This is essentially a software tool that enables users to see live broadcasts of people and selectively join in conversations by clicking on the live broadcast of that person. In order to join the interactive chat room, users typically have to provide their details, such as name, age, hobbies, work, location etc. These are stored as user attributes that can be used for the purposes of searching. A search engine is provided to enable users to search for other registered users who match specified requirements, e.g. based on age or hobbies. Alternatively, the software can search for particular users by name. In this way, users can establish a relationship with someone and then search on their name to see if they are participating in the video chat room. In order to ensure that the user information is up to date, the software is operable to provide users with the ability to change their attributes, so that they reflect what they wish to discuss or are interested in at the time. Attached to every video conferencing signal is an identity tag, which specifies user attributes and video chat room name etc.

Once a user has specified the attributes of the people he wishes to chat with, he is presented with a screen that is divided into segments, each segment including a live video image of a chat room participant with the required attributes. Within the chat room users are able to invite and prompt other users to join in a conversation by simply clicking on the user. In this way, the user joining the chat room is able to view all of the relevant participants and navigate through the room to other users by simply point and click.

The video chat room could be established on a dedicated network such as the internet. In this case, only terminals with internet access could participate in the

video chat room. Alternatively, using the ITCN, the video chat room could be provided on say a cable network, but accessed via any network such as the internet or a satellite networks. Hence, users can access the video chat room using a television with a satellite set top box, a PC, a mobile or an interactive mobile phone, the only requirement being that the user terminal is able to receive television signals and is provided with a screen and a video camera. One of the main benefits of this is that the system can operate across a wide variety of channels, thereby allowing a greater number of users to access and use the system.

By providing user television terminals with cameras and facilities for transmitting video content, it is possible to provide an interactive video mail system. This is similar to e-mail, except the content is video not text. In order to provide this, typically the user's terminal includes software for selecting a "new video mail". The sender's camera equipment is then set up to record the video message that the sender wishes to send. The recorded message is stored and then either sent directly to the desired recipient at a selected address or to a pre-determined data storage centre. In the case where the message is sent directly, the video content is stored at the recipient's terminal and a prompt is included in a video mail box list. When this prompt is selected, the recipient is presented with the video content that is retrieved from some local storage location. In the case where the message is sent to a remote data storage centre, a prompt that has a link to the relevant location in the data storage centre is sent to the recipient's terminal and included in a video mail box list. In this case, when the prompt is selected, software in the recipient's terminal sends a request for the video mail content to the data storage centre. In response to this, the

data centre transmits the relevant video content to the recipient, who is then able to view the video message.

Video mails may optionally include video conferencing prompts can be opened immediately to establish a video link or stored for later use. The video mails could be stored on any one of a server, a device with the capability to store content, e.g. memory cards, hard drives, removable discs etc. or at the point of broadcast.

In addition to the above features, each user terminal may optionally be provided with software for enabling a video diary. This is in essence a program that stores video content on, for example, a PC, Mobile or TV for each particular day. The user may then access their video diary and retrieve content by simply inputting the selected date they wish to view. Once this information is entered, the application searches the diary and the video content for the selected date is presented to the user.

The video diary software is operable to allow the user to browse through their video diary by enabling the user to see previews of the video content for each day. The user may also edit content, by for example including prompts are previously described, and attach notes to the content. The software is operable to search the notes. The user also has the option to attach their video diary entries on e-mails to their friends and family, thereby allowing other users to share memories and real life experiences. As before, the video content in the video diary can either be stored at the user's terminal or could be associated with a link to an address on a remote data server.

The video content for each of the video mails and the video diary can be stored in various formats, such as MPEG- 2 or a DVB standard format or Quicktime, AVI etc.

In addition to the video diary, the user application is also operable to provide an electronic video phone book. As is standard, the phone book contains entries of numbers, names addresses and notes on numbers stored. However, contained within each entry of the electronic video phone book is a digital image of the person listed or a picture relating to the number, for example, the person's house. These digital images can also be animated. The images also preferably include prompts for setting up a video call. An advantage of this is that users can visually search for entries on their phone book and select and video call. This automatically causes the user application to control and effect the setting up of a video conferencing link. Entries may also contain users' interests, hobbies, work, location, age, sex and other details, which are searchable.

Software is additionally provided for sending a live interactive video mail to enable the sender to join in and be a part of live video broadcast on a TV program or in a video chat room. In this way, a user watching, say, "Who wants to be a Millionaire?" could send out a request to join in the program by sending an e-mail or, as previously described, responding to an interactive prompt on screen. If the request is accepted, a video link is then established between the user and the broadcaster and signals from the user's camera are broadcast or streamed to the broadcaster's data network, where they are merged with the television content that is being broadcast. The signals from the user's camera are then directly broadcast over the broadcaster's network to all viewers

watching the program. In this way, the user then becomes a contestant whilst, for example sitting on their sofa at home watching TV.

It will be appreciated that by using the ITCN, the video content described with reference to each of the video conferencing, the video mail and the video diary could be retrieved from any source, regardless of the equipment available at the user's terminal. In this way, video content could be sent from a digital set top box to a satellite set top box or a PC or a specially adapted mobile telephone.

In order to allow a mobile phone to pick up new frequencies of radio and television, the frequency ranges that its antenna can receive are adapted. In addition, the mobile phone includes a miniature digital television receiver and software driven television tuner, which allows the user to view both digital based television and IP based broadcasts. To allow a user to view digital and IP content, the its screen is adapted to display various forms of broadcast and support many formats, for example PAL, NTSC, SECAM, HDTV and DRC.

Included on the mobile telephone are arrow keys that can be user to navigate around a user GUI that, among other things, allows the user to access the ITCN. Users select the TV channels they want to view using the telephone by selecting either the left/right arrow keys to move around an interactive program guide and pressing OK key to view or C to Cancel or Yes / No Keys, depending on the hand held device. Alternatively, the telephone could be adapted so that in a television mode, the number keys cause the television receiver to go directly to the specified television channel. When a user selects a key, the mobile phone can either go direct to the frequency of the selected channel or alternatively send out a request to the ITCN to view the content from another network.

By adapting the mobile telephone and the frequency it can receive through software or hardware driven devices, the mobile is able to receive broadcast television content. The content can be broadcast directly or through the ITCN, which can be accessed using ITCN applications stored at a data centre or using pre-installed ITCN software applications on the SIMM card or memory of the telephone. These applications provide the mobile with the same ITCN functionality as can be accessed from their PC or television, including interactive television. For example, interactive prompts could be sent to the mobile telephone, which prompts can indicate the presence of video content or further information. The prompts could be embedded in text messages, thereby to provide interactive text based messaging.

Using interactive text based messaging, a direct transaction prompt can be sent to mobile devices to allow the recipient to click and purchase goods and services being advertised in the text message. For example, Figure 15 shows a mobile telephone that displays an interactive prompt that says:

"Buy now – two weeks in Paris for £30"

These interactive text based messages can be sent to multiple users across all networks and devices. The text-based messages could optionally include a prompt or a link to an internet web page or, for example, a WAP enabled site or video content. In this case, the URL of the web site is embedded in the prompt. If a user selects this by pressing the "ok" key, a message is sent via the ITCN to the relevant web page to retrieve the requested information. This is downloaded to the mobile phone by the ITCN in a format that can be received and

interpreted thereby. In this way, a user can access an internet web site by clicking on an interactive prompt that is included in a text based message via a mobile telephone. In case the user makes a mistake, a cancel button is provided to cancel a response to the prompt.

The mobile phone in which the invention is embodied has the ability to prompt users to access web pages, television programs, interactive adverts, iprogram, additional video content, computer games, video conferencing and digital television shopping sites. Once users search this content, the mobile phone provides the means to enable users to purchase goods and services.

As an optional and advantageous feature, the user terminals that provide access to the ITCN include voice recognition software. This can be provided in the user's television or set top box or PC or mobile telephone. Using this speech recognition software, the user terminals could be adapted to interpret spoken commands, as an alternative method for users to navigate the ITCN and purchase goods and services on digital television and the internet as well as directly. This can be used to purchase from web sites, multi-content web sites, directly, digital sites, interactive programs and interactive adverts. For example, if the user says "Yes" in response to an interactive prompt, this would be interpreted by the voice recognition software as a positive command, which would then be executed accordingly. This could be, for example, a command to connect the user's terminal to a transaction processing centre or web based transaction processing centre or digital TV transaction processing centre.

In order to improve services already described, the ITCN includes an application that is operable to merge sources of broadcast content, internet

content and digital content, in order to construct a multi-content site. The digital content may be derived from a pre-existing digital site. In addition, the ITCN is operable to include in television adverts or programs that relate to a particular product, a link back to the manufacturer's or supplier's web site, where the product can be bought and sold. In this way, users can access the product web site whilst watching adverts or television programs that are being broadcast all over the world. This in effect enables retailers and distributors, for example, to be linked to a digital television site, without the cost of having to set up such a site themselves. Hence, if, say, a car manufacturer or re-seller wanted to sell cars on television, the ITCN could include prompts in any program that showed the product in question. Selection of the prompt by the user would cause them to be connected to the manufacturer or re-seller's web site, where they could, if desired, purchase the relevant product.

In addition to the other advantageous features already described the present invention also provides a new graphics engine for a computer game. The graphics engine is essentially software, which sends out instructions for creating the graphical images for the game using video-on-demand techniques and broadcasting technology. Hence, at least some of the game images are transmitted over a television channel to users in real time, rather than being stored on the user's terminal or on a disc or CD ROM. Of course, it will be appreciated that the channel to which the user's television receiver is tuned may have to be changed in order to receive this televised video content. In this way, games could contain live television broadcast to support and enhance detail in for example video sequences or in-game graphics games containing live DVB. An advantage of this is that the game uses less central processor capability and operates within a low bandwidth environment, whilst providing superior quality

graphics. Furthermore, through caching content on servers and users terminals it is possible to accelerate the games graphics considerably.

In addition to the above, the graphics engine is also operable to use the object interaction as described above. In this way, players are able to see, feel, hear and interact with characters and objects just as they would in real-life. For example, users would be able in a car racing game to "feel" the shape of car as they walk round the vehicle. Users will also be able to activate moving features such as the engine. Furthermore users will be able to feel the surrounding environment. For example when a user puts their character's hand in water the software is operable to adjust the frame rates around the surface of water to create a feeling of depth and weight, by adjusting the speed of the frames in between the mapped points.

There are various ways for a user to access the game. For example, a prompt to a game relating to a television program or advert could be displayed during that program. By selecting the prompt the user software would cause the user terminal to be connected automatically to the game, which is typically located on a remote data server, preferably on the ITCN. Once the user has accessed the game, it is then possible to play. It should be noted that the game application can be set up to allow multiple players. If the application is provided on the ITCN, this means that users can play on-line games with people on a mobile or PC or television or public telephone box through the ITCN. Hence, the number of players having access to the system is expanded greatly.

The graphics engine is backward compatible. This means that it can provide patches to games that contain details on supporting content and addresses of the

relevant data centres video servers, which contain the MPEG game content. In addition, it can provide enhanced detail on 3D objects with superior texture mapping which is digital video broadcast quality as objects can be formed in real images and broadcast live using advanced VOD.

Additionally the games graphic engines can be used to support DVD games and CD games for PC/TV or can be used directly for games stored completely on-line. By providing games on-line, users have the ability to buy time on playing games on their PC, TV, Mobile. This allows users to pay only for the time they play, known as pay as you play.

The graphics engine described above can be adapted to support hardware devices to improve the quality of the downloaded images.

The game facility can of course be linked with the interactive video conferencing, so that multiplayers users are able to see and interact with players, this is advantageous as it enhances the interactivity and fun of the game.

Figure 17 shows another system in which the invention is embodied. This includes a multi-platform web 298 site that can be accessed from either a digital television or a PC system via a telecommunications network such as the internet. This can be implemented on the ITCN described above, although it is not essential. Behind the web-site is a server 300 that controls the system functionality. Connected to the server 300 is a database 302 having a plurality of entries, each associated with a particular category of product, for example cars. The web site is connected through direct web links to a plurality of other

web pages 304 and so their associated access databases 306. These web pages belong to retailers or reseller's who want to sell their products via the web site. Information in the access databases is searched using a dedicated search engine at the web site.

Contained in the access databases 306 of the other shopping web-sites is information on each product available for sale, including, for example, the location of the product, an estimated time of delivery and its price. The location is important where the retailer has many outlets. This information is provided to the user and so enables them to gain exact details from the nearest reseller as to how many products they have in stock, how much it costs, how long it will take to deliver and a quote for its price.

In addition to price and location, the access databases 306 also include data for constructing images of the products. Also stored can be information for recreating sound associated with the product. For example, in the case of a car, the sound generated by the engine could be stored.

Each product in the databases has an attached signature, which states its type, colour and specifications. For example, a clothes product electronic signature would contain its size, colour, material, style, age group, price and brand. In this way, the search engine is able to filter through the databases to find specific electronic signatures, which match the requirements of the user.

By searching the linked access databases, the search engine can find the location of any product that the user wishes to purchase. However, the user is not aware of this and simply interacts with the web site by selecting the object

on an enabled web page. In this way, users are able to find specific products without knowing where to look.

Products that the user wants to purchase can be filtered specifically by their attributes such as colour, price, size, style for clothing items and year, colour and model for cars. The filters are selected by the user from the web site. For example, if the user is looking specifically for a purple top and blue jeans but does not know which retailer stocks these clothes, then details on the products can be entered into the web-site. Once the relevant filters are selected, the search engine looks in the relevant access databases for suitable products. If the search engine successfully finds a product meeting the user's requirements then the user is presented with information on the product. If not, the search engine provides information on the nearest matches. Included in this information is data for constructing an image of the product. The product image is then displayed on the screen of the digital TV or a PC system.

In order to construct the product images, Mpeg formatted video or photography techniques are used. This is done using real images of the object that have been scanned into a computer. The real images include images of the object from many different angles. In addition, the real images could be of the product in different configurations, for example, a car could be recorded with its doors open or closed or with the boot open to let the viewer see the internal layout and capacity. Internal images could also be stored. The images could also show different versions of the same product, thereby allowing the customisation of that product. For example, a car could be shown with or without a car radio or a CD system or an air conditioning system. Furthermore, the car could be shown running, e.g. so that the user can see the wheels turning. To enhance the

realism of the image, a series of real time images could be taken to show the car moving against a particular background.

At the same time as recording video images, sound is also stored. This is provided to improve the real-time feel of the image when the user is viewing it. The sound can then be manipulated to allow a user to hear product features pass by as an object image is rotating.

The real still images are created using a 360-degree panoramic camera that scans real photography around an object using pre-defined object paths. This allows a sphere of still images to be built up. This sphere of images is then mapped out onto a mapped path of an object's shape. The mapped path is needed to define the object's structure. The path is in essence a series of equally spaced photo points positioned along an object to enable a computer to take the images and compose the object's structure by placing the photos exactly at each defining structural point of the object.

When the mapping is complete, individual frames are taken out to reduce an object's size and are transformed into a Mpeg format. This is done using tweening and interpolation.

Tweening is a technique that involves deliberately taking out of a part of an image to speed up data transfer and reduce the file size thus reducing bandwidth requirements. The technique is in fact used in many existing technologies, for example the compression of Pict files to Giff or Jpeg formats where unnecessary data is extracted from the file to reduce the file size by up to eight times. Interpolation compression technology enables frames to be created

around an object that does not exist. In this way, the rotation and interaction of an object can be viewed by the end users to run smoother by stretching out the number of frames in the process for the computerised structural imagery of an object.

Using tweening and interpolation, a high standard of video compression is provided. Typically, this allows the image of an object, in full 24 Bit Video and comprising 14 million colours, to be stored in only 100K of memory.

The image presented to the user is improved using time compression techniques that enable the ability to define the speed at which the object interacts with the end user from point to point on the mapped path. This is done by defining the rate at which the still images or image frames are presented to the user. Since the frames are equally spaced apart, varying the rate at which they are presented gives the user the impression that they are scanning over the product being viewed at different speeds.

By reducing the frame rate on specific areas, product features can be highlighted, thus extending the viewing time and ensuring the maximum potential for the product sales. For example, the vendor may want to bring, say, the product logo to the attention of the user and so the frame rate in the region of the logo can be slowed down. In this way the user is drawn to look at the logo. Similarly, the frame rate may be slowed down in the vicinity of particular selling points of the product. Altering the frame rate in this way enhances the feel of the image presented to the user.

In addition to highlighting important product features, time compression is used

as a form of a safety guard where low bandwidth is critical. By reducing the frame rate, greater fluidity is provided when the user is interacting with the product. Furthermore, the possibility of system failures is reduced. This is because the system has a safety window in time lines during which it can adjust for errors. For example, in the event of data corruption through server failure, a mirror server system is activated and immediately downloads the relevant data to the end user. With a large enough time frame in the safety window this can be done without major disruption to the user.

The use of Mpeg as the standard format for the construction of object images enables real, filmed images of the object to be used to build up an object image, thus increasing the realism of the image. In this way the image looks and feels just as it would in real life.

The web site uses a combination of languages for specific tasks including HTML in its basic form for simple layout instructions with the addition of DHTML for the creation of interactive scrolling menus to enable the user to select specific products and activate features. XML extensible mark up is the main language used as one of the core languages in the application. XML is a similar language to HTML in that it uses encapsulated tags with additional parameters to describe content. The main difference is that HTML is a scripting language with a range of pre-defined functions, whereas XML allows the definition of new functions from scratch by the use of extensions. In this way, XML allows the creation of specific new mark up language to suit the tasks required of a web site. This enables the creation of a web site in which users can define how they interact with that site. In this way, users can directly interact with the images of the commercial objects on the web through the

ability to define object parameters and active functions on the web page. A further advantage of XML is that it is best suited for use with particularly large web sites, such as those with databases or e-commercial capability.

To optimise the speed of the data transfer between the server and the end user, the application uses a data packing compression system whereby data is packaged together in units to allow optimal streaming of the data across the Internet. This helps limit data loss when information is transmitted over the internet. Additionally, the application is developed with key capabilities such as the ability to convert streamed audio and video in the main formats as used on the Internet at present, such as relaudio R2 and Quicktime format. It is also adapted to decode Mpeg video formatted data, which is needed for the streaming of Mpeg frames to complete an object's structure at the command of user.

Using the above-mentioned techniques, when a particular product is found by the search engine, a user can opt to view and interact with an image of the product. As further advantageous feature, the search engine is operable to search for video or internet content, such as a web site, relating to the product found in the initial search.

If the user wishes to view video content relating to the product, the video option is selected. The search engine then searches for relevant video content, typically by searching a database that includes information on the sources of such material. Should relevant video be found, it is broadcast to the user and presented on screen. Hence, the user can demand and view real broadcast, visuals and sound content relating to the product, either separately or in

conjunction with internet content, thereby enhancing the user's interactive experience.

If the user wishes to view internet content relating to the product, an internet option is selected. The search engine then searches for relevant internet content by searching for web sites that include information on the selected product. Should relevant internet content be found, it is presented on screen to the user, together with any real broadcast, service or other information requested by the user.

As mentioned previously, the web site 298 can be accessed from a digital television or an internet linked PC. In order to enable the television or PC to benefit from the full functionality of the site, a software application is provided for installing on the user's television or PC. This application is written using Java (originally created by SUN Microsystems). Through the use of Java based applets, the application has a wide range of functionality and is compatible with most other existing web based technology. In addition, it also allows the application to be scaled and enables the creation of specific instructional code, which allows the user to command the object's orbital direction within a defined parameter and the object's projection direction. With the addition of further instructions, a zoom facility can be provided, thereby allowing a user to zoom in and out on an object and activate specific features.

When using a PC 308 to access the web site, the control application 310 is installed on the user's hard drive 312, as shown in Figure 18. This software adapts the PC file system, which contains commands of every key command and mouse action of the computer, to provide new instructions. This is done

using an extension that sits non-active in the system folder of the PC until the web-site is activated. The activation of the new commands is turned on when a web page is launched. These new commands could of course be downloaded to the user as and when desired, for example, when the user initially sets up an account with the site. In addition to storing the application, the user's home computer equipment, such as the RAM 313, cache 315 and hard disc 312 are all used to store data to increase the speed and resilience of the system.

As is well known, the PC 308 can be connected to the internet using a modem 314. When the web-site 298 is opened, information is relayed through the modem 314 to the internet server 316 via the telephone network. In this case, signals from the PC 308 are in digital form. These digital signals are converted by the modem 314 to analogue signals and transmitted over the telephone lines to the server. The server 316 then interprets the messages and relays back the relevant data as requested. This data is transmitted in analogue form and converted to digital by the modem. Because of the control application 310 installed on the hard drive, the user is able to open the web site 298 and search for a product. When a product of interest is to be viewed, the image data stored in the relevant access database is downloaded to the PC 308 and stored in its memory. The application 310 uses this data to construct the image, which can be manipulated and rotated by the user.

In order to control rotation of the images, existing instructions for the PC's mouse 318 are adapted, thereby to enable users to direct the movement more freely through hand movements of the mouse. For example, as shown in Figure 19, the mouse commands could be adapted so that by moving the mouse to the right the image can be rotated clockwise towards the viewer and by moving the

mouse to the left the image can be rotated anti-clockwise away from the viewer. Movement of the mouse 318 diagonally away from the user could be defined to cause the image to tilt.

Further features may be added, for example, the ability to increase the speed at which an object image is moved. This can be done by adjusting the speed at which the user moves the mouse or alternatively by allowing the user to select the speed from a menu and fixing the speed accordingly. The altering of the speed at which the object moves does not, however, affect the relative speeds at which frames are presented to the user. Hence, the overall feel of the image as it is being rotated is unaltered.

As mentioned previously, the user can also access the site 298 using a digital television. Various arrangements exist for allowing digital television to be connected to the internet. Figure 20 shows a simplified version of one such system, in which the application 320 is stored in a digital set top box 322 that is connected to the television 324, which itself is connected to a modem 326.

Connected to the modem 326 is a switch array 328 that controls where signals are directed. Connected to the switch array 328 are internet and content portals 330 for allowing access to the internet, and in particular in this case to the web site 331. Also connected to the switch array are an MPEG encoder 332 for coding signals into an MPEG format and a series of video servers 334 for providing video content to the television 324.

When the web-site 298 is opened, information is relayed through the digital set-top 322 box to the Internet server 331 via satellite or cable. In this case, signals

are transmitted in digital form. The server 331 then interprets the messages and relays back the relevant data as requested. Because of the control application 320 installed in the set-top box 322, the user is then able to open the web site 298 and search for a product. When a product of interest is found and to be viewed, the image data stored in the relevant access database 300 is downloaded in real time to allow the application to construct the image, again in real time, which image can be manipulated and rotated by the user. This image can be presented to the viewer whilst live television pictures are being broadcast in the background.

In order to control rotation of the images in the digital television system, a dedicated controller can be provided. Alternatively, existing instructions for keys on the television's remote control can adapted. Figure shows a remote control that has keys for selecting the web site, requesting product details, viewing features and purchasing products. When the "viewing features" key is pressed, this switches the control's numeric keys into a mode that allows them to function as direction keys and thereby control the angle from which the image is viewed. Furthermore, when the "viewing features mode" is selected control commands for the plus and minus volume keys are altered to provide zoom in and out capability.

As with the PC based system, the speed at which an object can be rotated is variable. This feature is controlled by the number of times a direction key is pressed. For example, if the user presses the number on the TV controller twice then the object will rotate at a greater frame rate to that one press on the key. Thus the greater the number of times a key paid is pressed, the greater the frame rate and the faster the object will react.

In each of the PC and television systems, the application is operable to allow the user to select the background that is presented when the product image is being viewed. In the case of the television this could be a currently broadcast television program. Alternatively, it could be video images that are downloaded or broadcast over the internet.

Whilst in both the PC and television based systems it is possible to vary the speed of movement of the object image, it should be noted that there is generally a maximum velocity at which an object can rotate. This is due to the limited bandwidth and because it would be impractical to have an object rotate at speeds such as frames per second when there might only be 10 frames, which make up the composition of the image. In view of this, a maximum frame rate is set for each of the products.

A major distinction between the PC system and the digital television system is that in the television system the object image is assembled in real-time and actually forms part of the web page by broadcasting the object imagery via satellite (or cable) instead of downloading the data. In this way, users are able to interact with objects in an almost real time environment and when the user indicates that the image is to be rotated, signals are passed from the television (or set top box) to the relevant server. In contrast, in the PC system, the image data is downloaded and stored on the PC's hard disc. Interaction between the user and the image is then controlled using the data stored on the hard disk. The digital television system could also be operated in this way, to save on bandwidth requirements, but in this case the data would be stored in a memory in either the television or set top box. Both the digital television and the PC

systems use Mpeg video technology and decode the video at the receiver.

Another difference between the digital TV and PC analogue method is the quality. On the PC system with the objects imagery there is greater emphasis on the need to morph images to assemble a complete object whereas with the TV, the full object imagery can be streamed due to a greater availability of bandwidth.

In order to allow users to purchase products, the web-site 10 is integrated with various banks' processing systems. This is done by connecting the Active Server pages of the web sites to the banks using X.25 or ATM technologies. The latter is a more flexible method as it offers greater scalability.

When the web site is opened a menu is presented listing a plurality of product categories, e.g., clothing and cars. The user selects the product category and the search process begins. If clothing is selected, a dedicated clothing menu is presented, as shown in Figure 22. This includes an option to allow the user to select the features that are to act as a filter, e.g. colour and item of clothing. It is also possible for the user to select the stores from which he is prepared to buy, for example Topshop, Next, Hugo Boss or French Connection.

Once the relevant features are selected as filters, the search engine searches the database to identify the relevant web-links, which in this case would be to all shops that sell clothing or, if a limited list of shops is selected, to the sites of those retailers. When suitable links are found, the search engine accesses the relevant retailer's access database via the relevant web site. The access database is then searched and relevant products are identified. The results of

the search are then presented to the user.

If many products are found the search can be refined by selecting further filters, such as price or brand or using a seasonal filter. If two identical products are found the application is operable to compare the prices of each and present the cheapest to the user.

If cars are selected, a dedicated car menu is presented, as shown in Figure 23. Again, this includes an option for the user to select the features that are to act as a filter, e.g. year, type and colour and may also include a list of optional stores. Once the relevant features are selected as filters the search engine searches the database to identify relevant product entries. When suitable products are found, the search engine uses the link to the retailer's web site to interrogate that web site for further information on the product. The results of the search are then presented to the user.

As with the clothing option, if many products are found, the search can be refined by selecting further filters, such as search by price, search by brand or using a seasonal filter. In addition, if two identical products are found the application is operable to compare the prices of each and present the cheapest to the user.

When the results of the search are reported, the user is then able to select a product to be viewed. If a particular car is selected, the appropriate image is presented on the screen. This image can be rotated and moved by the user, so that it can be viewed from all angles. The interior of the car could also be viewed. In addition, the sound of the engine could be played. Furthermore, the

car could be viewed in motion. In this way the user can interact with the product in real-time and thereby gain a sense of the true look and feel of that product.

In the case where the user wishes to view a plurality of products, the video content for each product can be stored, for example in a television digital set top box or in a PC or on the ITCN middleware servers and then viewed simultaneously. In this way, the user can compare simultaneously, on screen, each product. This improves the interactive experience for the user.

The menus presented to the viewer are preferably transparent. This is because real-time adverts relating to similar products could be broadcast behind menus on the digital television method. Additionally, this enables users to carry out a search whilst still viewing products and web pages in the background.

Furthermore, with digital television the interaction of objects can be carried out whilst live pictures are being broadcast in the background. Thus enabling commercial adverts to play in the background adding sound and video to the background which strengthens a user's experience of their interaction with an object. Take for example if a user was viewing products sold in a Virgin Store, using on their digital TV, not only are they able to interact and rotate products whilst adverts are playing in the background, but they are also able to select the sounds and pictures in the background. Thus enabling the user to select and view video trailers and listen to music at the same time as interacting with products in the store which enhances their interactive experience.

When the screen is adapted to display broadcast television video signals a

prompt can be presented to the viewer during a currently broadcast television program. The prompt contains or is able to find a pre-selected URL for a web-site. For example, the prompt may say "click here if you want more information on the car in this advert (or program)". If a viewer gives a positive response to the prompt, the pre-determined URL is used to connect the user's terminal directly to the internet web page that provides the information. Preferably, the web page is displayed on a portion of the screen simultaneously with the currently broadcast television program.

In this arrangement, the web site of the advertiser could be presented to the user. This may be set up to allow the user to purchase the product. Alternatively, where the prompt is displayed during a television program, the user could be taken to the web site to enable them to find out details of local dealers who stock the product in issue and how much it costs, etc. In either case the web page could be shown in a portion of the television screen at the same time as the currently broadcast program. This is advantageous.

The web site described herein provides consumers with a fully interactive shopping experience. In particular, the shopping web site allows users to specify product characteristics and then provides a search engine for searching an extensive product database to find suitable matches. Contained in the database is information that enables images of the product to be constructed and viewed by the user and additionally allows the user to selectively rotate the image and change its configuration. In this way, a system is provided that allows the user to interact fully with the product and gain a feel for its look and quality prior to purchase.

A further advantageous feature of the system is that each product in the database is linked to a web page of a retailer that stocks and sells the product. In this way, when the search engine finds a suitable match, the user is able to identify not only the desired product, but also where that product is stocked. Hence, the system in effect provides the user with a means for searching a plurality of different web sites, without actually having to go to that site and conduct a separate search. Furthermore, the web-site is adapted so that a user can simply and securely purchase products directly from the site.

As will be appreciated, the ITCN can be used in conjunction with the web site described above. Hence, when a user has entered the site, searched for and found a product of interest, the search engine is selectively operable to search the ITCN database(s) for that product and provide an indication of whether there is any relevant video content and if so when it will be available. Of course the broadcaster could have a reservoir of stored video that can be selected and downloaded on demand as and when desired by the user, again either directly or via the ITCN.

There are various ways for allowing a user to access the ITCN and/or the web site. For example, the user can start from the shopping web site described above. In this case a user can select a search option, find a product of interest, select a "search for related video content" option and then view any broadcast video relating to the product that is found. Alternatively, the user can access the system whilst viewing a television broadcast. In order to allow this, means must be provided on screen for connecting the viewers' terminal to the internet or a digital network. An example is shown in Figure 24. In this case, the screen is partitioned to show the normal television picture, with internet or digital

content wrapped round the screen. Provided in the internet or digital content are interactive prompts for enabling the following:

(a) viewing of a particular product 340
(b) searching for information on the product 342
(c) browsing of internet sites generally 344
(d) viewing of features 346

This display of the internet content can be permanent or selectively displayable by, for example, pressing a button on the user's remote control.

The "view products" prompt 340 is operable to provide the user with information on a specific product, including, for example, where it can be purchased locally or where it is cheapest. The prompt 340 may include a menu that allows the user to select one of several product options. Once the particular product is selected, the requested information is found and presented to the viewer. The prompt may automatically connect the user's terminal to an internet site where the product can be purchased.

Selection of the "search" prompt 342 initiates a search for information on whatever product is defined by the user. This could connect the user to the shopping web site previously described, where searches can be conducted on the basis of product attributes. Alternatively, another search mechanism could be provided for finding internet content relating to the product or specific video content. Alterntaively or additionally, the search prompt could allow the user the option to serch for real time television content as previously described.

The "browse" prompt 344 allows the user to browse through internet web sites, whilst still watching the television. This allows the user to flick between multi/broadcast web sites by selecting a category, for example, sports, entertainment, travel or news. Selection of the category of interest allows the user to surf through the web sites and television content (which can be done as previously described, preferably through channel switching) of interest.

The "features" prompt 346 allows the user to access general information and other web sites. An example of a features menu 348 is shown in Figure 24. This includes news and interviews, generally relating to the program being viewed (both of which are typically cached digitally to save on bandwidth), press releases, championship points, contenders, events and access to an internet shopping site, for example the shopping site described above. Of course other features could be provided.

As an alternative to the arrangement shown in Figure 24, the system could be adapted to allow the user to define the layout of the screen. For example, the user could choose to continue watching the television program in a portion of the screen whilst performing searches, interacting with products, purchasing, browsing through web sites, viewing additional information, or in the case of the shopping system described previously that allows a user to rotate product images, defining settings speed. Alternatively, the system could be set up by default so that it works in the background, allowing the viewer to continue watching the television program in full screen mode, whilst the system performs searches or processes orders and procurements etc.

An advantage of having converged broadcast and internet content is that it

reduces the bandwidth required and the memory needed in the user's home equipment, e.g. digital set-top box or PC. For example, were Internet video to be streamed on a digital television site, this would require around 3 megabytes of memory. However, in the system described above no memory is needed to broadcast video, which means that all the memory in the digital box or PC can be used for transactional processing and constructing queries for the search engine, customer services and site interaction.

To improve the speed and resilience of the multi-content web sites, interactive and graphical data is, typically, cached on servers which output this directly to the users' digital boxes or PCs, without the use of the internet. This is advantageous as it improves the speed of the site.

Whilst the various systems described above allow a user to be directly connected to a web page in response to a prompt that is shown during a currently broadcast program, the prompt could equally be displayed during a recorded program. The prompt could be stored with the recorded program and displayed automatically when the program is replayed. When a user responds to the prompt, the relevant web-site is displayed as before. In addition, the recorded program could include a link to video content, so that when the program is played back a request for the content is automatically generated and sent over, for example, the ITCN, which causes the linked video content to be braodcast to the viewer.

In order to improve access to the shopping system via the ITCN, users are given a unique identifier, such as a personal number or swipe card that can be used to identify them anywhere in the world. This enables them to use any television,

PC or mobile telephone to access the ITCN. In this way, the user can purchase products and arrange delivery to their home or any other designated address.

The unique identifier is allocated when the user sets up an account with ITCN. This identifier is stored together with the user's personal details, such as name and address. At this stage the user is provided with an encrypted password, that allows them to purchase products from any suitable terminal. When the user logs in, the identifier is used to identify the user's details. Should the user wish to purchase a product and have it sent, he can either have the product sent to the default address, typically his home address, or alternatively specify a new address. Should the user change his details and/or any specified preferences, this is automatically transmitted to the terminal at their home address.

In order to enable a user to track a product that is being sent, a global internet automated delivery processing system is provided. This system provides a tracking system, such as that developed by UPS, for monitoring the progress of a parcel on route to a purchaser. This is an integral part of the overall shopping web site or ITCN based system. The delivery information is, however, updated by the carrier delivering the parcel.

In practice, as soon as an order is placed, details of the purchased product are sent to the carrier, which then either collects the product and starts the delivery process or awaits receipt of the product from another party. Once the carrier has the product, the tracking system is then employed to monitor the progress of the parcel. Information on the progress of the parcel is available to the user via either the shopping web site or by selecting an option on the multi-content images on the television screen.

Details of the products that are purchased, such as its physical attributes, are stored for each user. In this way, when the user logs onto the shopping site or uses his television, the list of products purchased can be selectively viewed. The user application may provide the option of viewing images of the products in the "ordered" list. In addition, there may be an option for having further searches conducted. If this option is selected, the stored product details can be automatically used as the basis for further searches for more products having those attributes.

By clicking on or otherwise selecting specific products that have been ordered, details of the purchase such as the destination, current location and expected time of delivery of the parcel can be obtained. Within a certain time of making a purchase, a user can cancel his order or change some details, such as the address to which the parcel is to be sent or the quantity of products required.

As will be appreciated, the ITCN is a very flexible and wholly interactive system that provides the user with a multitude of different access routes. The ITCN can be accessed as follows:

(1) via the search engine;

(2) from the delivery outlook application;

(3) by responding positively to a prompt that is displayed during a real time television broadcast;

(4) by responding positively to a prompt that is displayed during a recorded television program;

(5) by selecting a browse option either via the shopping web site or via a prompt that is displayed during a television program.

The ITCN links programs and adverts across television networks around the world. Using the search engine, multi-content broadcast web sites and television programs and adverts relating to the user's desired preferences can be found. Additionally, through a television program a user can gain access to a web site relating to the products, services or information currently being shown on their television (or PC etc) screen. In either case, the user can search for information according to selected criteria or in the case of a product based on product attributes that the user specifies and then be provided with both broadcast images and internet or digital content relating to the desired product. This is advantageous.

A further advantage of the ITCN is that it enables retailers and distributors to be linked via their web pages to a digital television site that is provided by another party, for example, the product manufacturer, without the cost of having to set up such a site themselves. As an example, a car manufacturer may wish to advertise a particular type of car on television. If the manufacturer connects to the ITCN, internet and or digital content is merged with the video content in the advert and presented to the viewer. This internet or digital content includes links to web sites or digital information sites that are provided by local re-sellers of the car. By selecting these links for further information, the viewer can be automatically connected to resellers and/or distributors that are certified by the manufacturer. These sites can then be searched in order to identify products that match attributes specified by the user.

A skilled person will appreciate that variations of the disclosed arrangements are possible without departing from the invention. Accordingly, the above

description of a specific embodiment is made by way of example and not for the purposes of limitation. It will be clear to the skilled person that minor modifications can be made without significant changes to the operation described above.

Claims

1. A method of providing video or radio content from a plurality of different content sources to a user terminal, the method comprising:

receiving a request for content from the user terminal;

identifying a source of the content requested;

determining whether the user terminal or another pre-defined target terminal is suitable for receiving content directly from the source identified and, if not,

obtaining the requested video or radio content, and

transmitting or broadcasting the video or radio content to the user or target terminal in a manner or format that is receivable by that terminal.

2. A method as claimed in claim 1, wherein the content sources include at least one of a cable television source, a satellite television source, a terrestrial television content source and a radio station.

3. A method as claimed in claim 1 or claim 2, comprising searching for video or radio content based on criteria specified by a user.

4. A method as claimed in claim 3, comprising displaying search results to the user.

5. A method as claimed in claim 4, comprising receiving a user selection from the displayed results and generating a request for the selected video content to be transmitted to the user terminal.

6. A method as claimed in any of the preceding claims, comprising presenting an interactive prompt at a user terminal, the interactive prompt being indicative of further information or services.

7. A method as claimed in claim 5, wherein the interactive prompt is indicative of the availability of television video or radio content and selection of the prompt generates a request for that video or radio content.

8. A method as claimed in claim 5, wherein the interactive prompt is operable to connect the user terminal to the internet.

9. A method as claimed in any one of the preceding claims, comprising allocating a charge to the user based on the content transmitted.

10. A method as claimed in claim 8, wherein at least a portion of the charge is credited or transferred to the original source of the content transmitted.

11. A method as claimed in any one of the preceding claims, comprising processing the video content prior to transmission to put it in a format that is suitable for reception by the user terminal.

12. A method as claimed in any one of the preceding claims, comprising transferring the video content to a transmitter that is suitable for transmitting it in a format that is suitable for reception by the user terminal.

13. A method as claimed in any one of the preceding claims, wherein the request is received from a link to the video content.

14. A method as claimed in any one of the preceding claims, wherein the request is received from a link in an interactive games application.

15. A method as claimed in any one of the preceding claims, comprising sending to the user terminal a control command for causing the user terminal to tune to a frequency and/or channel that the content is to be transmitted on.

16. A system for providing video or radio content from a plurality of different content sources to a user terminal, the system comprising:

means for receiving a request for content from the user terminal;

means for identifying a source of the content requested;

means for determining whether the user terminal or another pre-defined target terminal is suitable for receiving content directly from the source identified and, if not,

means for obtaining the requested video or radio content, and

a transmitter for transmitting or broadcasting the video or radio content to the user or target terminal in a manner or format that is receivable by that terminal.

17. A system as claimed in claim 15, wherein the content sources include at least one of a cable television source, a satellite television source, a terrestrial television content source and a radio station.

18. A system as claimed in claim 15 or claim 16, comprising means for searching, preferably a search engine, for video or radio content based on criteria specified by a user.

19. A system as claimed in claim 17, comprising means for displaying search results to the user.

20. A system as claimed in claim 17, comprising means for receiving a user selection from the displayed results and means for generating a request for the selected video content to be transmitted to the user terminal.

21. A system as claimed in any of claims 15 to 19, comprising means for presenting an interactive prompt at a user terminal, the interactive prompt being indicative of further information or services.

22. A system as claimed in claim 20, wherein the interactive prompt is indicative of the availability of television video or radio content and selection of the prompt generates a request for that video or radio content.

23. A system as claimed in claim 20, wherein the interactive prompt is operable to connect the user terminal to the internet.

24. A system as claimed in any one of claims 15 to 22, comprising means for allocating a charge to the user based on the video or radio content transmitted.

25. A system as claimed in claim 23, wherein comprising means for crediting or transferring at least a portion of the charge to the original source of the content transmitted.

26. A system as claimed in any one of claims 15 to 24, comprising means for processing the video content prior to transmission to put it in a format that is suitable for reception by the user terminal.

27. A system as claimed in claim 25, wherein the means for processing comprise a digital to analogue converter.

28. A system as claimed in any one of claims 15 to 26, comprising means for transferring the video content to a transmitter that is suitable for transmitting it in a format that is suitable for reception by the user terminal.

29. A system as claimed in claim 27, wherein the means for transferring comprise a switch and/or router arrangement between the content source and the transmitter.

30. A system as claimed in any one of claims 15 to 28, wherein the request is received from a link to the video content.

31. A system as claimed in any one of claims 15 to 29, wherein the request is received from a link in an interactive games application.

32. A system as claimed in any one of claims 15 to 30, wherein the user terminal is any one of a digital cable TV set top box, a digital terrestrial TV set top box, a digital satellite TV set top box, an analogue television and an ASDL box or a mobile telephone with interactive capabilities, e.g. a WAPP or GPRS enabled telephone, or a TVPC.

33. A user terminal adapted for use with the system as defined in any one of claims 15 to 31.

34. A user terminal as claimed in claim 32 comprising means for sending requests for video content to the system.

35. A method of providing video content comprising transmitting video content from a system as defined in any one of claims 15 to 31.

36. A television signal that includes video or radio content transmitted from a system as defined in any one of claims 15 to 31.

37. An interactive television system comprising a television video and/or radio content source, means for storing information on video and/or radio content available from the content source and means for searching the stored information to find video and/or radio content that meets pre-selected, user-determined criteria.

38. A system as claimed in claim 36, wherein means are provided for generating a data entry field to allow a user to enter the pre-selected criteria.

39. A system as claimed in claim 36 or claim 37, wherein the video/radio content that is searchable includes currently broadcast content and stored content that is accessible on demand.

40. A system as claimed in any one of claims 36 to 38, comprising means for presenting the results of the search to the user.

41. A system as claimed in any one of claims 36 to 39, comprising means for causing the user terminal to tune to channel on which the selected video/radio content is to be broadcast.

42. A system as claimed in any one of claims 36 to 40, wherein the video content sources comprise cable and/or satellite and/or digital television.

43. A system as claimed in claim 41, wherein the video content sources are television broadcasters.

44. A system as claimed in any one of claims 36 to 42, wherein the pre-selected criteria relate to attributes of a product, for example, colour, price, size and style for clothing items and year, colour and model for cars.

45. A system as claimed in any one of claims 36 to 42, wherein the pre-selected criteria relate to the nature of the video content, for example, news, current affairs, financial or sports, etc. Preferably, means are provided for providing the video content found to the user.

46. A system as claimed in any one of claims 36 to 44, wherein means are provided for broadcasting selected video/radio content to the user in real time.

47. A system as claimed in claim 45, wherein means are provided for sending a command to the user terminal to cause it to tune to a channel on which the video/radio content is being broadcast.

48. A user terminal adapted for use with the system as claimed in any one of clam 36 to 46.

49. A method for capturing video content, the method comprising:

identifying a source of video/radio content,

selecting at least a portion of specific video/radio content stored in that source, and

storing a link to the video/radio content source, the link including details of the video/radio content source and the selected portion of the selected video/radio content,

wherein the link is such that selection of it causes a signal to be transmitted to the source of the video/radio content, which cauese the source to transmit the video/content to a pre-determined location.

50. A method as claimed in claim 48, comprising selecting the link, sending a request to receive the selected video/radio content to the source and receiving video/radio content that is broadcast from the video/radio content source.

51. A method as claimed in claim 49, wherein the step of selecting is done while the video/radio content is being viewed or transmitted.

52. A method as claimed in claim 49 or claim 50, further involving including an interactive prompt in the link, so that when the link is selected and the video content viewed, the prompt is automatically displayed.

53. A method as claimed in claim 51, wherein the prompt is indicative of the availability of a pre-pay movie, wherein selection of the prompt by the user causes a request for payment to be generated.

54. A method as claimed in any one of claims 48 to 51, comprising sending the selected link to another party via e-mail.

55. A method as claimed in any one of claims 48 to 51, comprising importing the link into a text document.

56. A system for capturing video/radio content, the system comprising:

means for selecting at least a portion of the video/radio content content being viewed or transmitted,

means for identifying a source of the video/radio content selected, and

a memory for storing a link to the video or radio content source, the link including details of the video/radio content source and the selected portion of the content,

wherein the link is such that selection of it causes a signal to be transmitted to the source of the video/radio content, which cauese the source to transmit the video/content to a pre-determined location.

57. A system as claimed in claim 55, comprising means for selecting the link and sending a request to the source of the video/radio content to receive the selected content and means for receiving the video/radio content that is broadcast or transmitted from the video/radio content source.

58. A system as claimed in claim 56, wherein the means for selecting at least a portion of the video or radio content are operable to do so in real time while the video/radio content is being viewed or transmitted.

59. A system as claimed in any one of claims 55 to 57, wherein means are provided for creating and sending e-mails and attaching the link to the e-mails.

60. A system as claimed in any one of claims 55 to 58, wherein means are provided for including the link in a text document.

61. A user terminal adapted for use with the system as defined in any one of claims 55 to 59.

62. An interactive television system comprising:

means for displaying a prompt on a screen during a television program, which prompt is indicative of an opportunity to join the television program,

means for receiving a response from a viewer with a video camera,

means for establishing a video link between the broadcaster and the viewer,

means for receiving video content from the viewer's camera, and

means for merging the video from the viewer's camera and the main broadcast, thereby to allow the viewer to join the television program.

63. A method of allowing viewer to interactively join a television broadcast comprising:

displaying a prompt on a screen during a television program, which prompt is indicative of an opportunity to join the television program,

receiving a response from a viewer with a video camera,
establishing a video link between the broadcaster and the viewer,
receiving video content from the camera, and
merging the video from the viewer camera and the main broadcast,
thereby to allow the viewer to join the television program.

64. A user terminal having a screen for receiving television content from an interactive television system, the terminal comprising:
a video camera;
means for responding to a prompt that is displayed on the screen during a television broadcast, and
means for sending video content from the camera to the source of the television broadcast.

65. A user terminal as claimed in claim 63 that is a television or a set top box or a mobile telephone or a portable device such as a palm pilot or a lap top computer.

66. A computer game for playing on a user terminal that has a screen, the game having a graphics engine for providing graphics for display on the screen and means for sending a request to a video content provider to cause video content to be broadcast in real time to the user terminal, whilst the game is being played, so that the real time broadcast forms an integral part of the game.

67. A mobile telephone that includes means for receiving television signals, means for displaying television content, a camera and means for sending signals received by the camera.

68. An interactive system comprising means at a remote location for storing information to allow a product image to be constructed, means for accessing the stored information and selectively constructing and presenting a product image on a screen of a user terminal and means for selectively moving the image to enable a user to view the product at different angles.

69. A system as claimed in claim 67, wherein two or more product images are presented on the screen at the same time.

70. A system as claimed in claim 67 or claim 68, wherein the means for selectively moving are operable to rotate the image.

71. A system as claimed in claim 67 or claim 68 or claim 69, wherein the product images are built up from a plurality of real images from real products.

72. A system as claimed in claim 71, wherein the real object images are filmed at precise angles using Mpeg and camera technology.

73. A system as claimed in any one of claims 67 to 71, comprising means for varying the rate at which the still images or image frames are presented to the user.

74. A system as claimed in claim 72, wherein means are provided for enabling a user to change the speed at which the image is rotated.

75. An interactive text messaging system for mobile telephones comprising means for generating a text message, means for including an interactive prompt

in the text message and means for sending the message to a pre-defined address or addresses.

76. An interactive text messaging system as claimed in claim 74, comprising means for receiving a response to the prompt

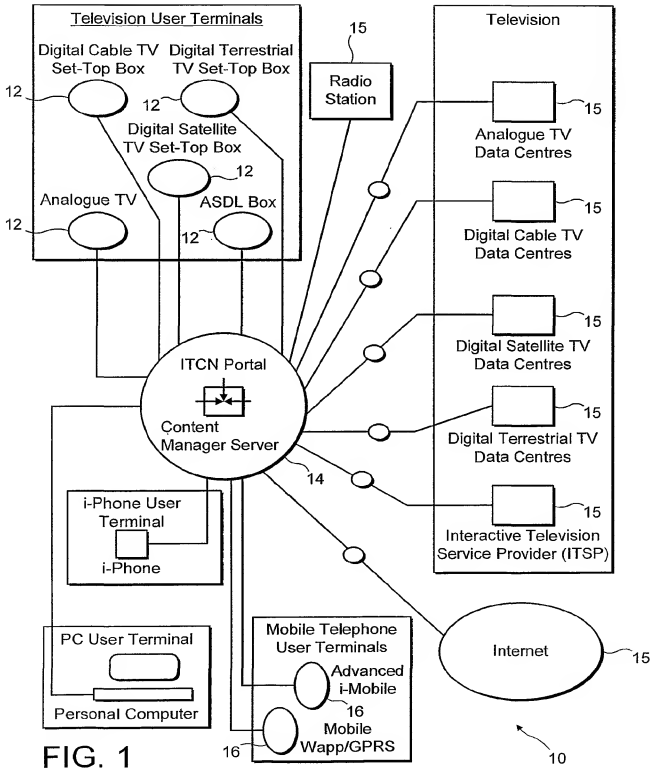

Television User Terminals
Digital Cable TV Set-Top Box
Digital Terrestrial TV Set-Top Box
Digital Satellite TV Set-Top Box
Analogue TV
ASDL Box
12
15
Radio Station
Television
Analogue TV Data Centres
Digital Cable TV Data Centres
Digital Satellite TV Data Centres
Digital Terrestrial TV Data Centres
Interactive Television Service Provider (ITSP)
ITCN Portal
Content Manager Server
14
i-Phone User Terminal
i-Phone
PC User Terminal
Personal Computer
Mobile Telephone User Terminals
Advanced i-Mobile
16
Mobile Wapp/GPRS
Internet
10

FIG. 1

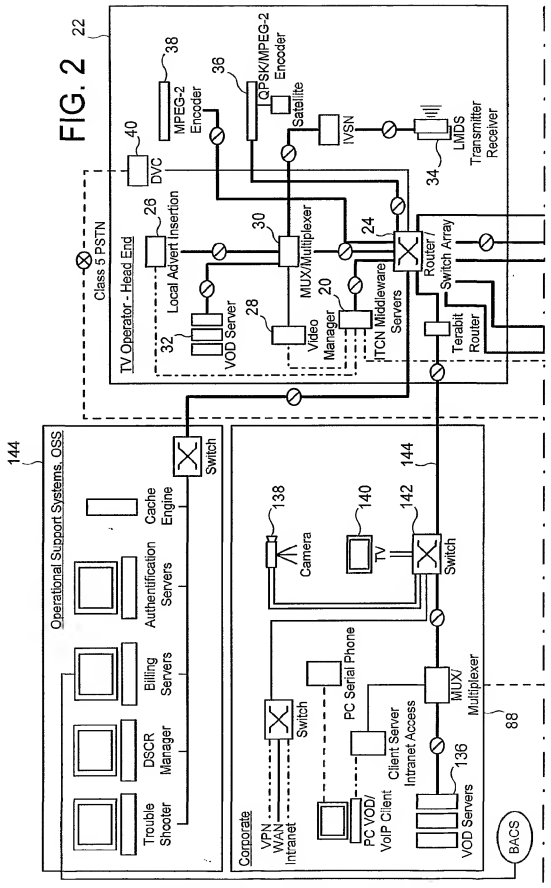
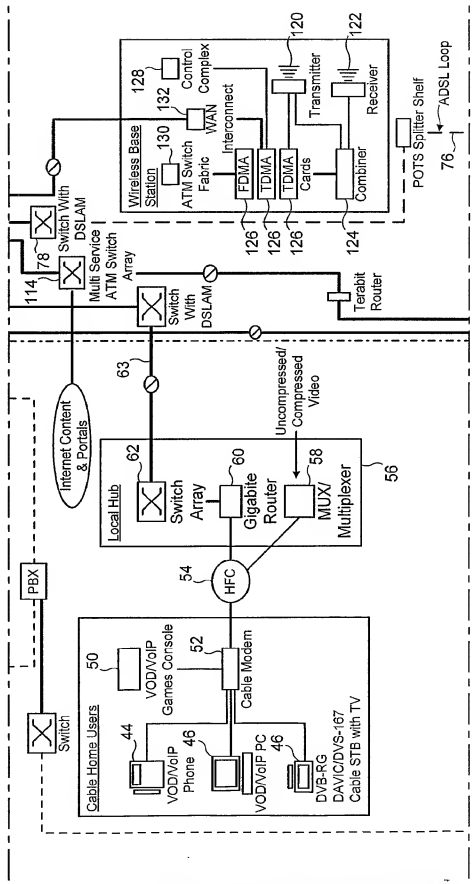

22
Class 5 PSTN
TV Operator - Head End
Local Advert Insertion
26
DVC
40
MPEG-2 Encoder
38
QPSK/MPEG-2 Encoder
36
Satellite
IVSN
LMDS Transmitter Receiver
34
30
MUX/Multiplexer
24
Router / Switch Array
Terabit Router
32
VOD Server
28
Video Manager
20
ITCN Middleware Servers
144
Operational Support Systems, OSS
Switch
Cache Engine
Authentification Servers
Billing Servers
DSCR Manager
Trouble Shooter
138
Camera
140
TV
142
Switch
144
Corporate
VPN
WAN
Intranet
Switch
PC Serial Phone
PC VOD/ VoIP Client
Client Server Intranet Access
MUX/ Multiplexer
VOD Servers
136
88
BACS

FIG. 2

FIG. 2 cont'd


Cable Home Users
VOD/VoIP Phone
VOD/VoIP PC
DVB-RG DAVIC/DVS-167 Cable STB with TV
Games Console
Cable Modem
HFC
Switch
PBX
Internet Content & Portals
Local Hub
Switch Array
Gigabite Router
MUX/ Multiplexer
Uncompressed/ Compressed Video
Switch With DSLAM
Multi Service ATM Switch Array
Switch With DSLAM
Terabit Router
Wireless Base Station
ATM Switch Fabric
WAN Interconnect
Control Complex
FDMA
TDMA
TDMA
Cards
Combiner
Transmitter
Receiver
POTS Splitter Shelf
ADSL Loop

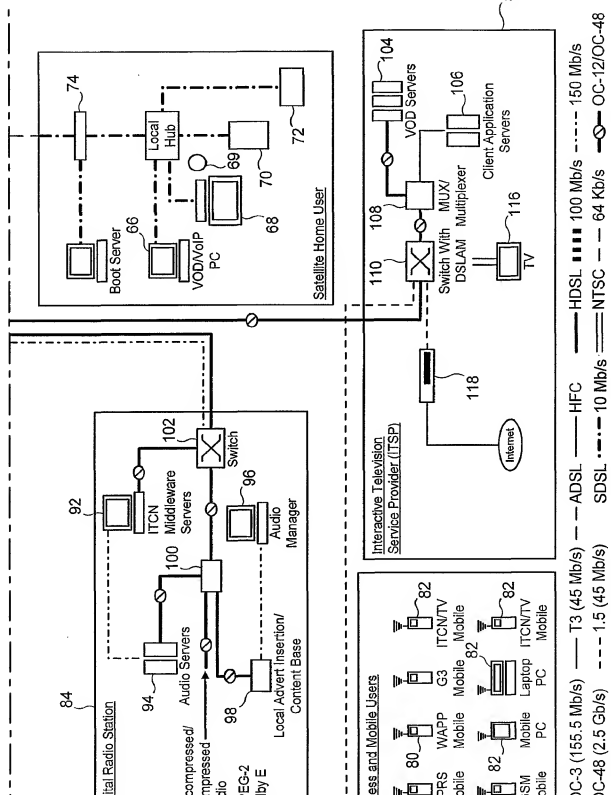

Class 5 PSTN
84
Digital Radio Station
Uncompressed/ Compressed Audio
MPEG-2 Dolby E
94
Audio Servers
98
Local Advert Insertion/ Content Base
100
92
ITCN Middleware Servers
102
Switch
96
Audio Manager
Wireless and Mobile Users
80
GPRS Mobile
WAPP Mobile
82
G3 Mobile
ITCN/TV Mobile
GSM Mobile
Laptop PC
Mobile
Interactive Television Service Provider (ITSP)
118
Internet
110
Switch With DSLAM
108
MUX/ Multiplexer
104
VOD Servers
106
Client Application Servers
116
TV
86
Satellite Home User
74
Boot Server
66
VOD/VoIP PC
68
Local Hub
69
70
72
OC-3 (155.5 Mb/s)
T3 (45 Mb/s)
ADSL
HFC
HDSL
100 Mb/s
150 Mb/s
OC-48 (2.5 Gb/s)
1.5 (45 Mb/s)
SDSL
10 Mb/s
NTSC
64 Kb/s
OC-12/OC-48

FIG. 2 cont'd

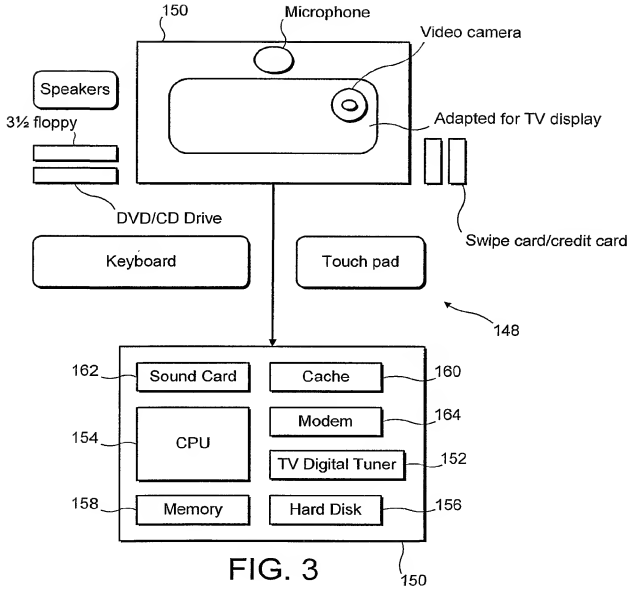

150
Microphone
Video camera
Speakers
3½ floppy
Adapted for TV display
DVD/CD Drive
Swipe card/credit card
Keyboard
Touch pad
148
162
Sound Card
Cache
160
164
154
CPU
Modem
TV Digital Tuner
152
158
Memory
Hard Disk
156
150

FIG. 3

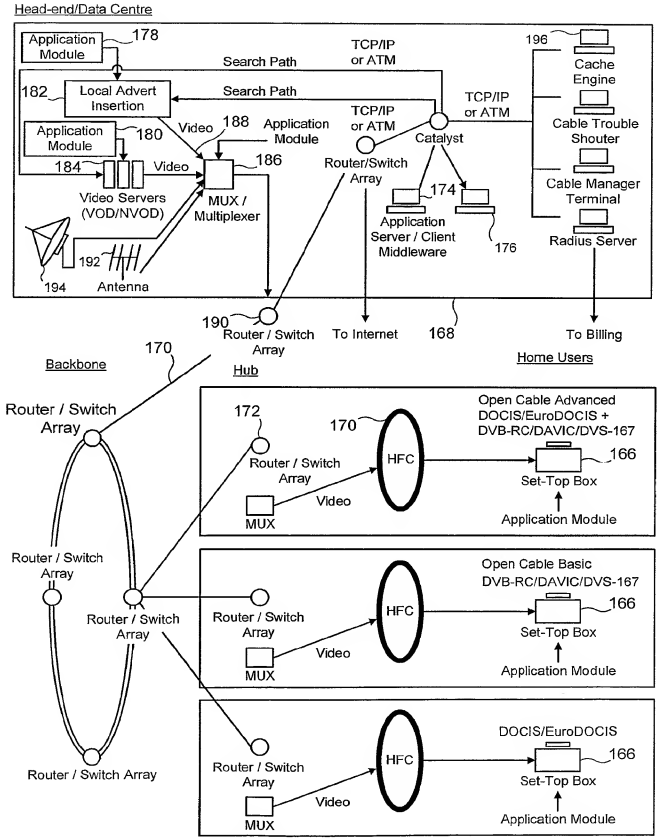


FIG. 4

HFC- Hybrid Fiber Coaxial/
ADSL- Asymmetric Digital Subscriber Line

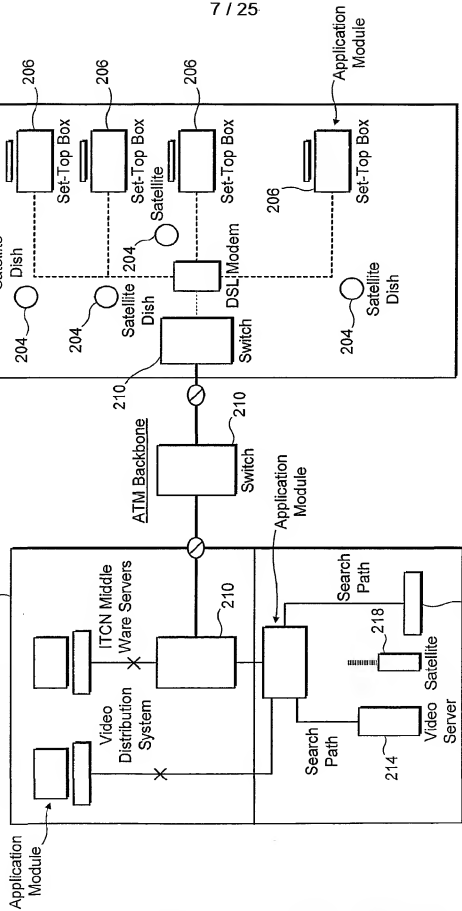

Application Module
Carrier Operations Centre
200
Video Distribution System
ITCN Middle Ware Servers
210
Search Path
214
Video Server
218
Satellite
216
Carrier Video Head-End
Application Module
ATM Backbone
Switch
210
Application Module
Home Users
202
Satellite Dish
204
Satellite Dish
204
Satellite
204
DSL Modem
Switch
210
Satellite Dish
204
206
Set-Top Box
206
Set-Top Box
206
Set-Top Box
206
Set-Top Box
Application Module
QPSK
OC-3 (155Mb/s)
Analogue/Digital Video
IP(10/100Mps)
xDSL

FIG. 5

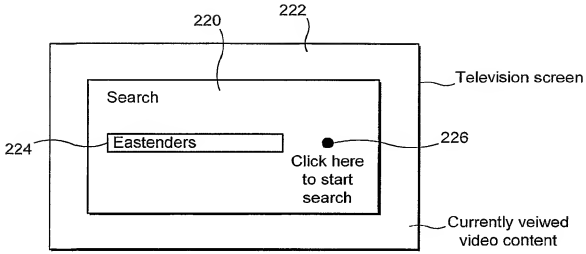

220
222
Television screen
Search
224
Eastenders
226
Click here
to start
search
Currently veiwed
video content

FIG. 6

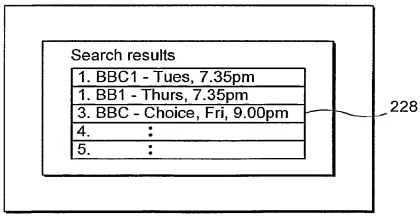

Search results
1. BBC1 - Tues, 7.35pm
1. BB1 - Thurs, 7.35pm
3. BBC - Choice, Fri, 9.00pm
4.
5.
228

FIG. 7

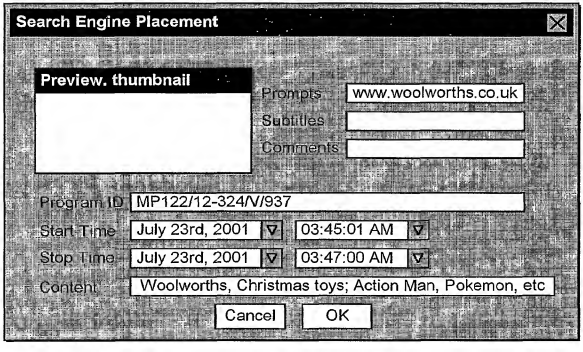

Search Engine Placement
Preview. thumbnail
Prompts
www.woolworths.co.uk
Subtitles
Comments
Program ID
MP122/12-324/V/937
Start Time
July 23rd, 2001
03:45:01 AM
Stop Time
July 23rd, 2001
03:47:00 AM
Content
Woolworths, Christmas toys; Action Man, Pokemon, etc
Cancel
OK

FIG. 8

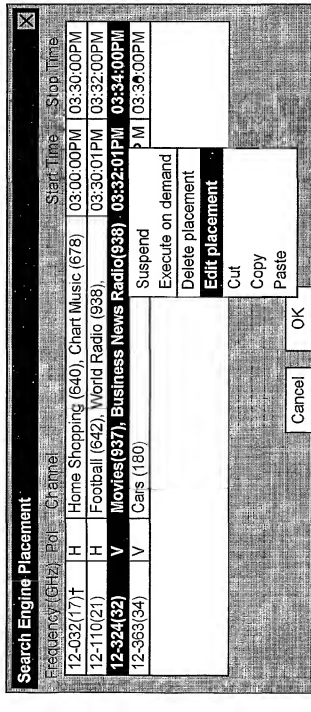

Search Engine Placement
Frequency (GHz) Pol Channel Start Time Stop Time
12-032(17) H Home Shopping (640), Chart Music (678) 03:00:00PM 03:30:00PM
12-110(21) H Football (642), World Radio (938) 03:30:01PM 03:32:00PM
12-324(32) V Movies(937), Business News Radio(938) 03:32:01PM 03:34:00PM
12-363(34) V Cars (180) 03:34:00PM
Suspend
Execute on demand
Delete placement
Edit placement
Cut
Copy
Paste
Cancel
OK

FIG. 9

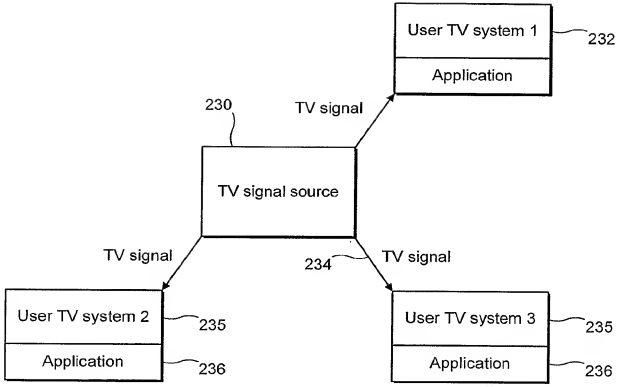

User TV system 1
232
Application
230
TV signal
TV signal source
TV signal
234
TV signal
User TV system 2
235
Application
236
User TV system 3
235
Application
236

FIG. 10

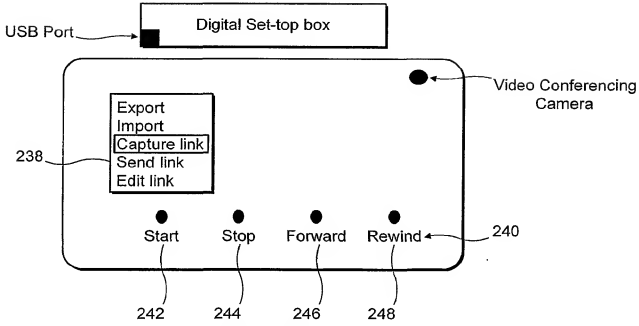
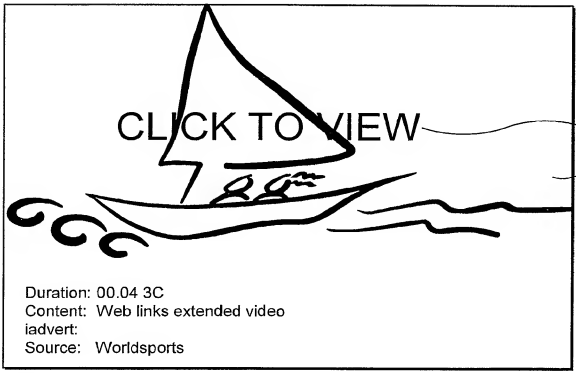

USB Port
Digital Set-top box
Video Conferencing Camera
Export
Import
Capture link
Send link
Edit link
238
Start
Stop
Forward
Rewind
240
242
244
246
248

FIG. 11

Please find enclosed, coverage of last nights sailing; Hope you enjoy:



Duration: 00.04 3C
Content: Web links extended video
iadvert:
Source: Worldsports

Regards

John Smith
johns @wstv.com

FIG. 12

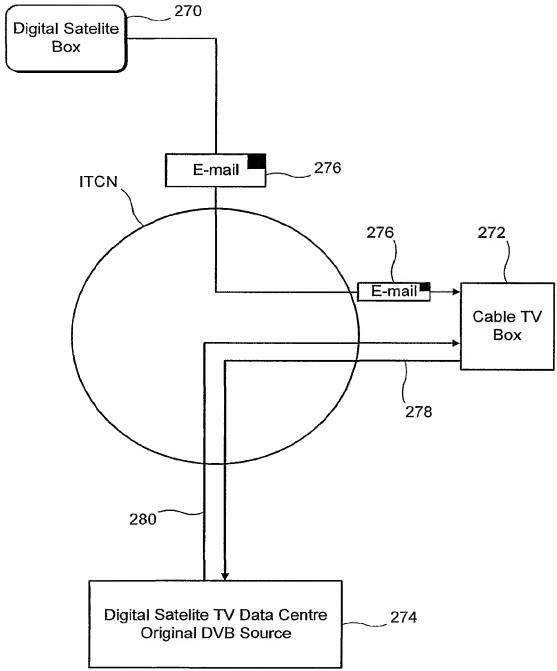

Digital Satelite Box
270
E-mail
276
ITCN
276
272
E-mail
Cable TV Box
278
280
Digital Satelite TV Data Centre Original DVB Source
274

FIG. 13

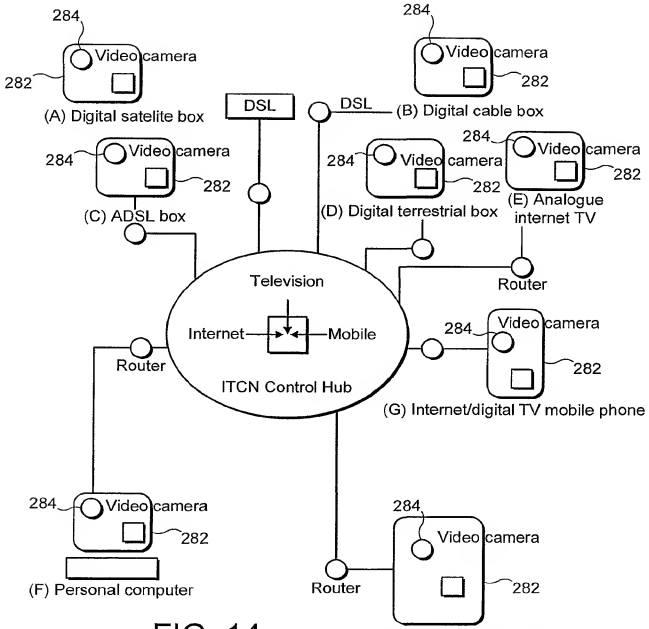

284
Video camera
282
(A) Digital satelite box
DSL
DSL
284
Video camera
282
(B) Digital cable box
284
Video camera
282
(C) ADSL box
284
Video camera
282
(D) Digital terrestrial box
284
Video camera
282
(E) Analogue internet TV
Television
Internet
Mobile
ITCN Control Hub
Router
Router
284
Video camera
282
(G) Internet/digital TV mobile phone
284
Video camera
282
(F) Personal computer
Router
284
Video camera
282
(H) Internet/digital TV phone box

FIG. 14

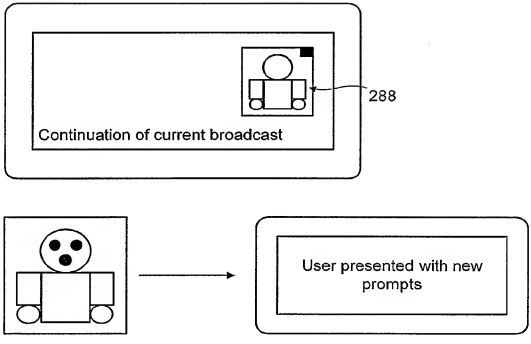

288
Continuation of current broadcast
User presented with new prompts

FIG. 15

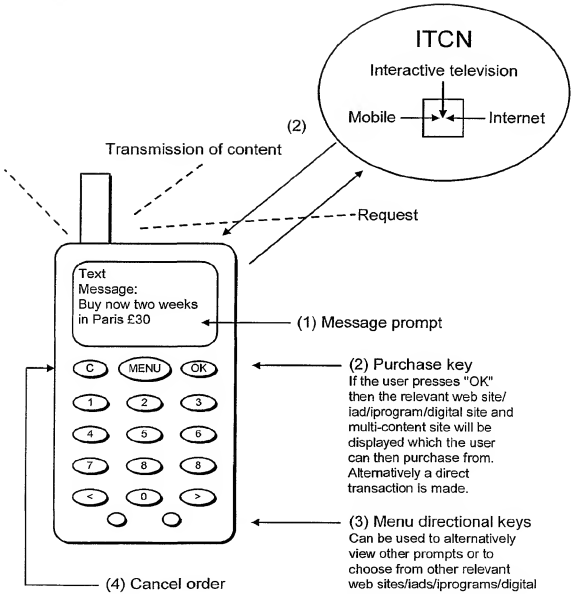

ITCN
Interactive television
Mobile
Internet
(2)
Transmission of content
Request
Text
Message:
Buy now two weeks
in Paris £30
(1) Message prompt
C
MENU
OK
1
2
3
4
5
6
7
8
8
<
0
>
(2) Purchase key
If the user presses "OK" then the relevant web site/ iad/iprogram/digital site and multi-content site will be displayed which the user can then purchase from. Alternatively a direct transaction is made.
(3) Menu directional keys
Can be used to alternatively view other prompts or to choose from other relevant web sites/iads/iprograms/digital sites and multi-content sites which the user can then purchase from.
(4) Cancel order

FIG. 16

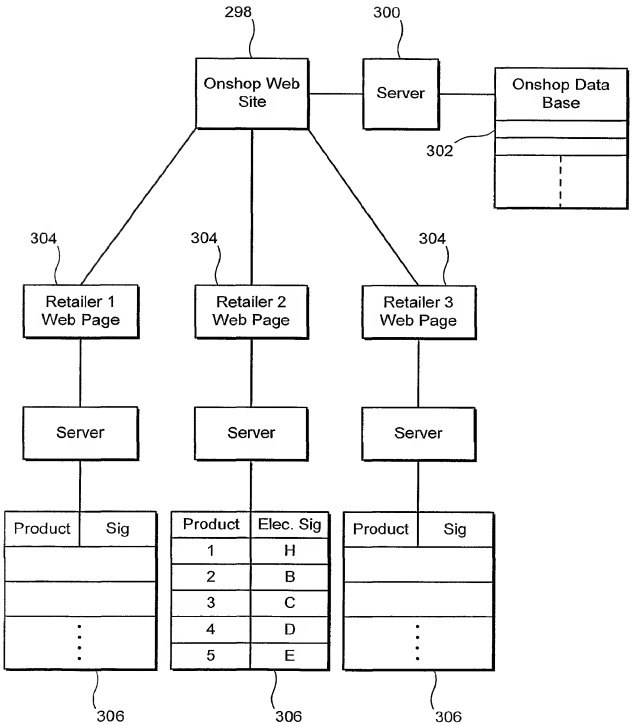

298
300
Onshop Web Site
Server
Onshop Data Base
302
304
304
304
Retailer 1 Web Page
Retailer 2 Web Page
Retailer 3 Web Page
Server
Server
Server
Product
Sig
Product
Elec. Sig
1
H
2
B
3
C
4
D
5
E
Product
Sig
306
306
306

FIG. 17

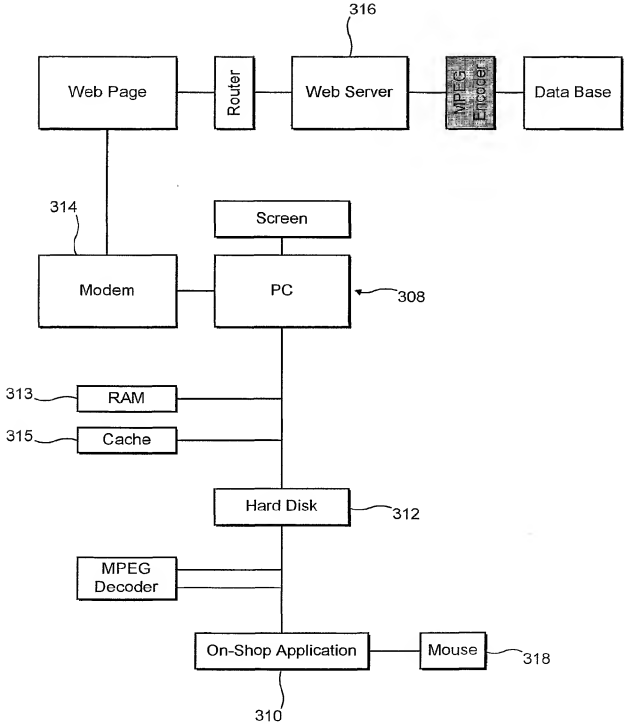

316
Web Page
Router
Web Server
MPEG Encoder
Data Base
314
Screen
Modem
PC
308
313
RAM
315
Cache
Hard Disk
312
MPEG Decoder
On-Shop Application
Mouse
318
310

FIG. 18

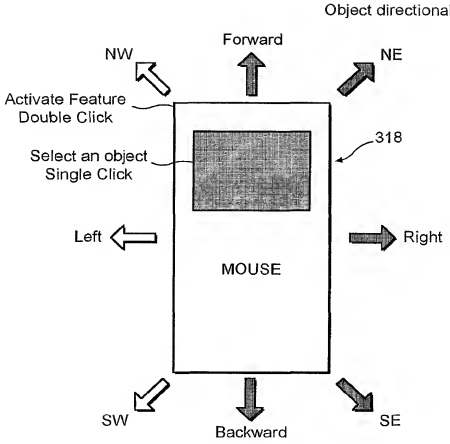

Object directional Control
Forward
NW
NE
Activate Feature
Double Click
Select an object
Single Click
318
Left
Right
MOUSE
SW
Backward
SE

FIG. 19

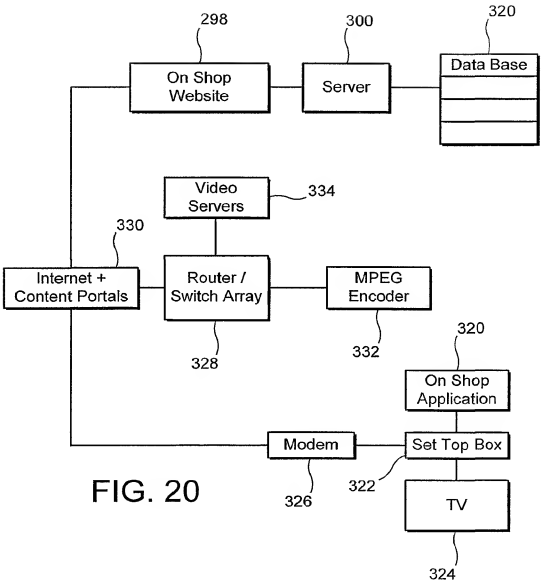

298
300
320
On Shop Website
Server
Data Base
Video Servers
334
330
Internet + Content Portals
Router / Switch Array
MPEG Encoder
328
332
320
On Shop Application
Modem
Set Top Box
326
322
TV
324

FIG. 20

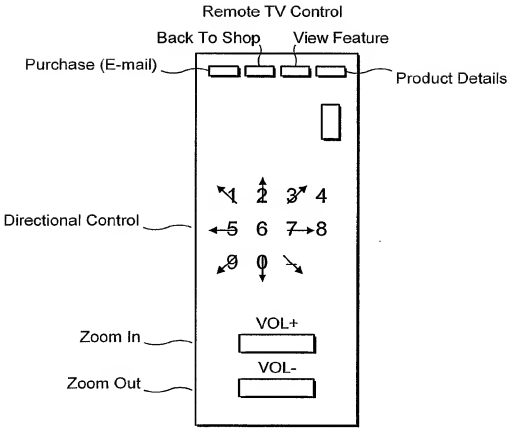

Remote TV Control
Back To Shop
View Feature
Purchase (E-mail)
Product Details
Directional Control
1 2 3 4
5 6 7 8
9 0
Zoom In
VOL+
Zoom Out
VOL-

FIG. 21

Stores: Topshop
Add Next
Hugo Boss
French Connection

Application database filter

Features:

Product matching by colour

ONshop Search

Clothes Colour

Selected items

Shirt ◁ Jeans ◁

Results

30 Matches found

New products ◁

More options

Search by price

Search by brand

Seasonal filter

Exit

FIG. 22

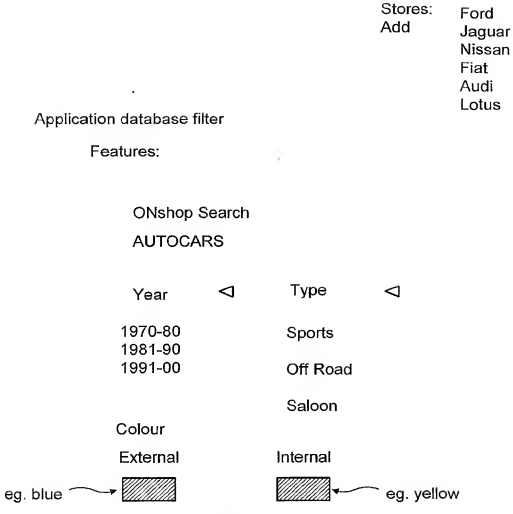

Stores:
Add
Ford
Jaguar
Nissan
Fiat
Audi
Lotus
Application database filter
Features:
ONshop Search
AUTOCARS
Year
Type
1970-80
1981-90
1991-00
Sports
Off Road
Saloon
Colour
External
Internal
eg. blue
eg. yellow
Results
50 Matches found
New products
More options
Search by price
Search by condition
Search by make
Exit

FIG. 23

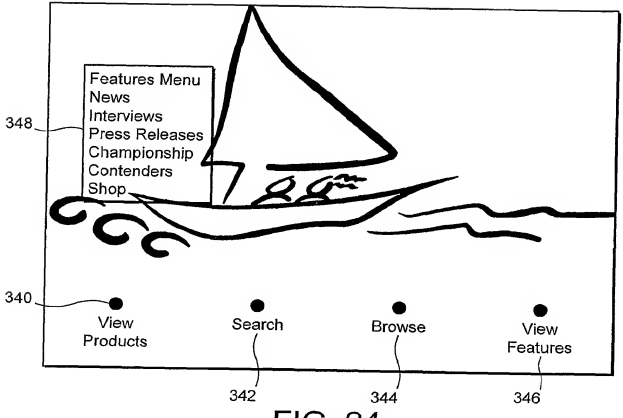

Features Menu
News
Interviews
Press Releases
Championship
Contenders
Shop
348
340
View Products
Search
Browse
View Features
342
344
346

FIG. 24

INTERNATIONAL SEARCH REPORT

Int onal Application No
PCT/GB 01/00577

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N7/173 H04N7/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	WO 00 05889 A (UNITED VIDEO PROPERTIES INC) 3 February 2000 (2000-02-03) page 14, line 17 -page 52, line 24 figures 1-32	1-60 61-65, 74,75
Y	WO 98 36552 A (GIBSON DAVID LYNTON ;MANNINGS ROBIN THOMAS (GB); BRITISH TELECOMM) 20 August 1998 (1998-08-20) page 4, line 22 -page 7, line 33 figure 2	61-64, 74,75
Y	WO 98 14881 A (INTEL CORP) 9 April 1998 (1998-04-09) page 9, line 30 -page 10, line 4	65

-/--

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

'A' document defining the general state of the art which is not considered to be of particular relevance

'E' earlier document but published on or after the international filing date

'L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

'O' document referring to an oral disclosure, use, exhibition or other means

'P' document published prior to the international filing date but later than the priority date claimed

'T' later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

'X' document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

'Y' document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

'&' document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 July 2001	16/07/2001
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Van der Zaal, R

Form PCT/ISA/210 (second sheet) (July 1992)

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication,where appropriate, of the relevant passages	Relevant to claim No.
X	WO 98 00976 A (SUN MICROSYSTEMS INC ;THOMSON CONSUMER ELECTRONICS (US)) 8 January 1998 (1998-01-08) page 6, line 24 -page 31, line 2 figures 1-24	1-5, 36-39, 67,68, 70-73
P,X	WO 00 13416 A (UNITED VIDEO PROPERTIES INC) 9 March 2000 (2000-03-09) page 34, line 31 -page 40, line 12 page 44, line 9 - line 30 figures 10-12,16	61-63

INTERNATIONAL SEARCH REPORT

information on patent family members

Int onal Application No
PCT/GB 01/00577

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 0005889 A	03-02-2000	AU 5000299 A	14-02-2000
		BR 9912370 A	17-04-2001
		EP 1097586 A	09-05-2001
WO 9836552 A	20-08-1998	AU 5875298 A	08-09-1998
		CN 1247665 T	15-03-2000
		EP 0960522 A	01-12-1999
WO 9814881 A	09-04-1998	US 5805636 A	08-09-1998
		AU 3986297 A	24-04-1998
		EP 1012727 A	28-06-2000
WO 9800976 A	08-01-1998	US 5903816 A	11-05-1999
		AU 3648797 A	21-01-1998
		EP 0909513 A	21-04-1999
		JP 2000513891 T	17-10-2000
WO 0013416 A	09-03-2000	AU 5694399 A	21-03-2000
		AU 5787299 A	21-03-2000
		BR 9913659 A	05-06-2001
		EP 1110396 A	27-06-2001
		EP 1099345 A	16-05-2001
		WO 0013415 A	09-03-2000